JOURNAL OF GAS LIGHTING & WATER SUPPLY.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CXXIII., No. 2624.] TUESDAY, AUGUST 26, 1913. [65TH YEAR.

EDITORIAL NOTES.

New University Schemes for Gas Students.

THE first annual report signed by Professor John W. Cobb, the Livesey Professor at the Leeds University, strikes us as being throughout in very practical vein. We see in it that Professor Cobb has been studying the conditions of the Department of Coal Gas and Fuel Industries from the point of view of how to bring them into better harmony with the requirements of the gas industry. We are rather afraid that in the beginning of things when the industry, through the Livesey Memorial Chair, became linked with the University, there was a little want of appreciation of the position. On the one hand, there was a University with high ideals as to educational procedure; on the other hand, an industry unaccustomed to the high University plane for the training of its prospective technical officers—an industry that had developed, from a somewhat homely affair, to one of great technical requirement in several directions to ensure the utmost economy and maximum result, and in which the technical men had grown with requirement, but not in all respects had there been *pari passu* expansion of the essential scientific foundation. It has from the first been held in these columns that a need of the industry was a greater leavening of practical training by scientific education—a larger and stronger union of the one with the other.

But our friends of the Leeds University (they will pardon us saying this now that experience has brought its new light) rather started out, in the educational courses for gas students, with the idea of bringing the industry promptly up to the University standards for such courses, instead of (so to speak) accustoming the industry to the higher forms of scientific training by commencing on moderate lines and gradually working up to the higher plane. We have duly recognized all the University has claimed and prescribed; but, with all their good intentions, even universities can only produce resentment and disappointment by trying in one move to drive home the full wedge, and to precipitately destroy custom. An industry which has its own modes of doing things is not, although it sees the value of change, going to submit all at once to a revolution in its methods of training its technical officers. A lasting change can only be brought about by not too obtrusive stages. But just as the industry has been aroused, by a gradation of influences, from a dormant to a keenly alive commercialism, so it can, we believe by the same process, be worked up to an appreciation of, and a recourse to—a recourse that may become a custom—the higher planes of University teaching. There must be a start somewhere; but the start must not be made by offering for acceptance the sheer side of a fully developed University course. This we think is where the mistake was made. When time-terms of training thus prescribed have been coupled-up to the time-terms of practical training, the total period incurred in training—to say nothing of the expense—has simply been dismissed with "impossible" labelled to it by those who have been unaccustomed to this new order of things, while something less pretentious might have appealed to them, and given a more pronounced beginning to the work of the University in conjunction with the industry.

The report of Professor Cobb shows that he has been observant of these things, and has traced where defect lies. The result is to be seen in the revision, by sanction of the University authorities, of all the diploma courses, by which, under certain conditions, the time-terms have now been considerably eased, and are brought more into conformity with the circumstances of the student for technical official position in the gas industry. Readers are asked to pay special attention to this modification (*ante*, p. 489). It goes without saying that the degree courses are, or course "*a*" is, where possible, preferable; but there are many students in the gas industry who have had experience in laboratory or drawing-office who should be tempted by the "*b*" and "*c*" two-year courses. Course "*d*" is a distinct innovation; and should especially appeal to gas engineers with articled pupils at their works within reasonable reach of Leeds. In many of the discussions that have of recent years taken place on the subject of technical training, the idea has been advanced as ideal that practical and scientific training should proceed simultaneously, by the "sandwiching" process. Professor Cobb has tried to meet this view by a practical suggestion for gas-works pupils within (as we say) reasonable reach of Leeds. The gas-works pupil is usually articled for three years; and the extension of this period by a further year would be of considerable advantage if, mingled with the practical work, time could be spent in the University gas laboratory and the lecture room. Professor Cobb suggests that three days per week, or equivalent time, should be spent at the University the first year; and at least two-and-a-half days, or equivalent time, in the succeeding year. In this way there would be no great break between works' practice and University study; there would be, to all intents and purposes, a continuity.

We cannot help thinking that this scheme should be found of great advantage to students who are qualifying for the gas profession; and we welcome it as a sincere effort on the part of the University authorities to branch out from rigid custom in the attempt to fit their facilities and services to the needs of the industry. The comments of Professor Cobb on this particular scheme may be emphasized by reproduction. He says: "It is a marked innovation, and "responds to a demand which has found frequent expres- "sion in the past. It would enable a student to acquire a "works and a University training during the period of ap- "prenticeship; and I hazard the suggestion that gas engi- "neers and works managers may be willing to ensure by "this means that their pupils are receiving systematic "scientific instruction by lectures and laboratory prac- "tice." We do appeal to gas engineers and managers who are geographically well-placed in relation to Leeds to consider this scheme very seriously; and to advise their pupils accordingly. It is easy to see that, if the scheme is properly worked, and proves successful, the gas-works within a fairly considerable radius of Leeds might become a favourite training-ground for future aspirants to technical position in the industry.

It will have been remarked that the times for the lecture courses are also revised, and that the laboratories are to be opened for evening work in conjunction with the lectures. This will give the students an opportunity for acquiring instruction in the higher branches of gas analysis and testing—such as they cannot, save perhaps in the very largest of gas-works' laboratories, obtain in the ordinary course of things. As Assistant Lecturer and Demonstrator, the Department has now the services of Mr. H. J. Hodsman, M.Sc. The equipment of the laboratory has been extended in very serviceable ways—in fact, in ways which will enable work to be carried on bearing upon modern developments and problems arising in an industry progressing in every direction, such as gas manufacture and supply, and the operations of which are distinctly bound up with scientific control. We compliment Professor Cobb, too, on the very practical ways into which he is guiding the research work of the laboratory—such as, the study of refractory materials; the thermal and physical conditions existing in carbonization; the influences of hot coke and surfaces, and radiation, upon the products of carbonization; the influence of oxygen dissolved in feed water on the corrosion of hot-water pipes and apparatus, by determining to what extent the oxygen liberated on heating the water is taken up by the metal of the apparatus; the influence of lime on the amount of the nitrogen in coal recovered as ammonia under determined conditions; and the influence of varying proportions of lime upon the fusibility of coal ash, as bearing upon its liability

to clinker. Such investigations are necessary, and will be found highly useful.

Through such work as we have referred to in this article, and through the modifications of the training courses, we confidently hope to see the Leeds University developing a considerably closer and more indispensable relationship with the gas industry. There is room for it.

A Drastic Measure.

In connection with the high prices ruling for coal, and the heavy burden they are upon the resources of the gas industry, together with the obstacle that they form to gas undertakings rendering the public service at the lowest possible charge, there are two questions which have an interest intensified at the present time by the conditions. The one question is how can such strikes as the national coal strike of 1912 be prevented, or, at any rate, be shortened; and the other is how can some control be exercised in order that the country and the gas industry may not be subject to any arbitrary measure of price that the coalowners choose to inflict, on an opportunity arising such as the one promoted by the prolonged and stock-exhausting strike of 1912—a strike which has been to the pecuniary advantage of the men in their wages, and to the coalowners through the considerably enhanced prices. Some who have addressed themselves to this subject, and have expressed their views at public or semi-public meetings, are hoping that, through some stroke of brilliant statesmanship, strikes may in future be brought under control; while others are of opinion that something ought to be done to bring the coalowners and the markets under some form of statutory regulation. In regard to the prevention or control of strikes, there is not the slightest doubt that the cause which produces pronounced ill-effects such as those from which the gas industry (among others) is at present suffering, is the thing that should be brought under control. But how is it to be done? Arbitration and conciliation schemes of a sort have been framed; but since then there have been larger and more mischievous strikes than ever. Co-partnership has been suggested as a panacea for strikes; but there is no present satisfactory basis in the coal industry upon which to erect a safe co-partnership. Indeed, there can be no such satisfactory basis unless there is such control applied that the interests of the consumers of coal are adequately protected. Otherwise co-partnership might be made a very profitable thing as between the coal miners and the coal owners, after the manner (without, of course, any suggestion that there was collusion in that event) of the great strike of 1912. Certainly co-partnership might be made to control both the trouble of a national strike and prices, if some genius would rise up and show how the gas sliding-scale could be applied to the coal industry, and the Legislature enforced it.

The strike largely assisted to promote the conditions that have placed such enormous controlling power over coal prices in the hands of the owners; and now on all sides, where the present burden of inordinate prices is felt to a considerable extent, the view is held that the Legislature should take measures to prevent a recurrence of a similar strike. No one suggests the nature of the measures. Those who legislate nationally and imperially, it is apparently felt, are the best able to legislate for this particular, if very difficult, matter. But the Government itself, with the disastrous 1912 strike before it, does not, either through supineness or fear (more probably the latter than the former), move in the matter. It is therefore the view of Mr. H. E. Jones, that the Government and members of Parliament ought to be awakened to a proper sense of their duty in this regard. But it is clear to him that the awakening can only be done by means of public opinion; and, before the public can be set in motion to stir up the Government, the public itself must be awakened. The dry bones, however, in a certain valley did not require more in the way of noise, shaking, and wind to give them form and life than the indifference of the public needs in the way of a shock to displace it by activity. At the meeting of the Wandsworth, Wimbledon, and Epsom Gas Company, Mr. Jones suggested a very drastic method of turning the public to the necessary frame of mind for bringing pressure to bear on the Government. We do not think he seriously meant it, but only gave voice to it as an illustration of what is essential to produce effect on the public mind. But let us consider it as a proposal. The defect in it is that it could not be applied before there is another coal strike; and we are very confident that Mr. Jones would be the last man to apply it, for his sense of public obligation as the counterpart of statutory privilege has been one of the striking characteristics of his professional and his administrative life. There is no doubt that personal inconvenience and personal loss are the only ways to set the public irresistibly in motion; and Mr. Jones thinks that another time it would be a good thing if the public were, by suffering a deprivation or reduction of artificial light, aroused to action in compelling Parliament to move in the matter of these calamitous strikes. But the resentment of an inconvenience by the public is rather an ephemeral sort of thing. It was so at the time of the national railway strike. There was great personal inconvenience. A wave of discontent spread over the land; but it subsided with the re-establishment of a normal state, as quickly as it was raised and set in motion. At the time of the coal strike, too, good as the gas undertakings were in maintaining their supply, the railway companies had to diminish their services. There was personal inconvenience there; but the public did not stir the Government into any strong action that resulted in any material shortening of the period of the non-production of coal.

The deprivation of the customary regular service of light in the home, the shop, the streets, and elsewhere might, of course, have a more stimulating effect upon the public, and force Parliament to a more deliberate consideration of the question. But whether Mr. Jones gave expression to the idea deliberately, or whether it was merely a passing thought, or a good illustration of what is necessary to provoke public opinion, any such action could only be taken by neglect on the part of a gas administration of provision against such an eventuality as a long strike. And Mr. Jones, among many men of the gas industry in a position to do so, has with pride taken credit for having been able, during the last coal strike, through administrative prevision, to keep the public well supplied with gas. To do this was only one part of the responsibility attaching to the privileges conferred on gas undertakings. The activating plan, too, could not be carried out except by arrangement with competitors that they, too, should assist in forcing public action by the same means. Without unity in this course, the gas industry would stand in a bad position in comparison; while, as the result of the last coal strike, the industry stands in high esteem with the public, and fixing gas-stoves and fires has been a prolific business. We do not want any reaction to the good feeling by failure in the hour of the public's greatest need. We do not desire that, as the effect of any lapse premeditated or even fortuitous, private householders using gas should take to buying oil-lamps or candles as a stand-by, the same as is the case where a competing light agent is used; nor that shopkeepers should take steps to have a duplicate lighting service as a source of protection against failure, as is also the case with a competing agent.

However, the more pressing and immediate matter is the high price of coal, for the full height of which no one who knows anything of the subject can find justification. Coal-stocks have been re-established in most cases to their normal level; and in many instances, through the lessons of the strike, in excess of the previous normal. This replenishing has been done at higher prices than ruled before the strike—all to the advantage of the coal owners and the miners, and over and above the benefit accruing to them from the high-priced coal currently needed for consumption since the strike. Stocks have been replaced; and the other conditions that bear upon demand, including exported coal, do not justify the still higher price fixed for gas coal for the working year now in progress. Sir Corbet Woodall would have some control placed over the coalowners; Mr. Charles Carpenter would like to see a tax reimposed on export coal, and metallurgical coke go from the country tax free; Mr. Jones would like to see the gas industry part-proprietors in the coal mines of the country, so as to maintain fairly level prices; or, as an alternative, he wishes to see some pressure brought to bear upon the political parties of the country to change from the do-nothing policy to the do-something one, in order that the chief original cause of the high-price trouble—national coal strikes—might be brought under better control. The part-proprietorship question was discussed when Mr. Jones first introduced it six months ago; but he does not now seem to insist upon it as possessing an unqualified practicability. At the same time, it is only in parallel with the statement of the First Lord of the Admiralty that the Government is going to secure proprietorship in an oil-bearing territory, for naval purposes; and the First Lord understood that other large oil-using industries were doing

the same. One difficulty is where is the coal-yielding or oil-yielding territory to be obtained, except at an impossible price, from those already in possession. The line of least resistance at the moment appears to be, by the force of public opinion, to get the Government to investigate the question of applying such statutory regulation upon colliery owners (railway companies and gas undertakings are under regulation) that home industry and other consumers of coal are not burdened by inordinate prices, subject in part to no real law other than that of the will of those in possession of the supply. The coalowners have proved conclusively their indifference to self-restraint when opportunity favours the exercise of their existing plenary powers; and they will repeat the proof whenever opportunity recurs. Under the present circumstances, they feel perfectly safe until, by the force of public opinion, the legislative machine is moved to action. But, as Mr. Jones says, public opinion has first of all to be set in action by some unusual process. There is the trouble. However, hope rises that there may be, by other and ordinary influences, a reduction of price before the next contract season comes round. History, as the Chairman of the Commercial Gas Company (Mr. W. G. Bradshaw) said, in an interesting reference to the subject last Thursday, will repeat itself.

The Commercial Metamorphosis.

Every gas-supply area has its individual characteristics but whatever the nature of these characteristics, the volume of the gas business continues to expand. And what is even more, the business, combined with the healthier markets for residual products than obtained a few years since, is of a character that has enabled the gas industry so far to withstand well the shocks of greatly enhanced coal and oil prices. The full pressure, however, of these obstacles to a still more luxuriant prosperity will, in this particular period of high prices, be felt in the current twelve months; and those concerns that, from the profits of the year, are able to make both ends meet without having recourse to the undivided balance or the reserve fund, will have something on which to congratulate themselves. These were (they have naturally been so with all chairmen of gas companies during the past three or four weeks) among the topics included in the address of Mr. W. G. Bradshaw to the proprietors of the Commercial Gas Company last Thursday. We will, however, pass them over without further reference on this occasion, as lately coal and oil have been the subjects of several comments in these columns, and certain aspects of the matter are dealt with in another article to-day.

The Commercial Company again show an excellent account for the past six months. The working has been good; the business continues in every branch to steadily increase (notwithstanding electrical competition at municipally cut prices); and the outlook in this connection is good. Here we have one of the most striking parts of the attractive speech of the Chairman at the meeting of the proprietors. The East-end of London has its characteristics; and one of them is that it is largely an industrial area. Predominating in the population are the workers in the industries and the varied lines of commerce. On the other hand, there are the large establishments in which they are employed, and the extensive trading premises. Now it is quite easy to see what has taken place under these circumstances. With the flux of time, some of the large industrial and business establishments have gone over to electricity for lighting purposes; but on the other hand, in those very establishments the use of cleanly, controllable gas for industrial purposes is leaping into rapid favour. The Company have realized their strength and opportunities in this direction; and the reward they are reaping by their enterprise is highly satisfactory. They have planted the employment of gas where it was never employed before for the purposes for which it is now consumed; and this will go on. In regard to lighting, the losses in the shape of large accounts have been more than compensated by the expansion of the use of gas among the workers of the area—from the artisan down to the labourer. High-pressure gas is also making headway against electricity. The consumption of gas for cooking and heating has also been continuously adding to the volume of output, and so contributing not only to the general compensation, but to the steady expansion of the bulk of the business. In fine, the Company have settled down on a stronger business base, with several new lines of business on which to operate.

This is the common experience. On all sides, we see capital being expended on enlargements of works and the laying-down of more economically working plant, because of this increase in business, and the new opportunities for cheap gas. Week by week our news columns report extension schemes—this week being no exception. The character of the gas business has undoubtedly changed from what it was a quarter of a century ago; but it is now more than double the volume of that period. The few accounts, the comparatively few consumers, have multiplied enormously; so much so that it was the boast the other day of the Chairman of one London Suburban Company supplying a large residential area that, in no less than 90 per cent. of the houses in that area, gas was used for one or more purposes. Another Chairman has also pointed to the fact that, while in his Company's district the maximum day's consumption now stood at an enormous figure, the minimum day's consumption was round about two-fifths of the maximum; whereas in times gone by, on a lower maximum day's output, the minimum day's consumption was in the neighbourhood of one-fifth of the maximum. Thus it is that, at the Commercial Company's meeting, Mr. Bradshaw, in alluding to the changed conditions of business, in which more accounts and more forms of application of gas are involved, was able to say: "Gas trading has become more stable than it was "twenty or twenty-five years ago, because gas has now "become the source of light, heat, and power of the masses "of the country rather than, as it was then, the luxury of "the few. . . I do say this, that I am quite sure that "gas is a sound and safe investment, with a very profitable "future before it." There is no one who knows what he is talking about who speaks in contra terms.

Cheap Gas and Horizontal Working.

The vertical retort systems have not been, and will not be, allowed to have a walk-over without powerful challenge. This has been apparent ever since the time that heavier charge working, and discharging and charging horizontal retorts from one end, displaced the wasteful and destructive systems that ruled in the days of traditional carbonizing practices. Vertical retorts have now been working for some time in various places; and results of all kinds have been published. The truth was promptly established, when successful working was ultimately achieved by vertical retorts, that, comparing them with the results from horizontal settings with old-style working, they showed marked and profitable advances. But it has to be admitted that, with the modern methods of working horizontal retorts, the superior advantages have been considerably fined-down; and Widnes to-day says that, under Widnes conditions, and probably the same would be held to be good in many other cases, horizontal retort working under modern methods is the superior of vertical working. All men will not agree with Mr. Isaac Carr, nor are we prepared (and he would not expect us) to accept as final and conclusive his decision at the present stage. When his new carbonizing installation on lines of his own devising has been established, and his estimates are confirmed by actual working, then will be the time to say positively that he was right in his choice and his plans. If he produces confirmation, the stately advance of the vertical systems will go along with still more measured step. However, here we have a matter in which Mr. Carr does not occupy an isolated position; there are many engineers who think as he does. Here we have a question, too, which Mr. Carr approached with a perfectly open mind, with the intention of finding out what was best for Widnes in the shape of new carbonizing plant, whether verticals, coke-ovens, or horizontal retorts; and he issues from his research a champion for the horizontal system, with modern machinery, and retorts each to deal with a ton of coal every twelve hours. While he does this, Ossett (as will also be seen by a report in our "Miscellaneous News") has, for precisely the same reasons—the supersession by economy of a wasteful system of working—adopted the Dessau vertical retort system.

Accompanying Mr. Carr's report (which we have his permission to publish) is a tabulated estimate of costs for the various systems under the respective productive conditions mentioned. These estimates speak for themselves; and in such a manner that the horizontal figures stand as a challenge to the advocates of the other systems to come out, and show where (if anywhere) the author of the compilation is wrong. What Mr. Carr says he has satisfied himself upon is that the capital charges are lower for the horizontal retort installation, and that the working results and costs and main-

tenance charges are comparable with those of any other system. In fact, all that he can find in favour of the vertical system is that it occupies less ground space than any other. Comparing horizontals with verticals, it is seen that an up-to-date horizontal plant, with a daily productive capacity per day of 3 million cubic feet, would incur a capital cost of only about £107 per ton of coal carbonized; while vertical retorts, for a production of ½ million cubic feet less per day, would mean an average of about £168 per ton. We are all aware that the capital expenditure for vertical retort installations is somewhat heavier than for a power-equipped modern horizontal installation. But it would have been interesting if, in the tabulated comparison before us, there had been set out the details of the cost of the vertical settings, so as to have been able to see a little more precisely where the difference arises between the £29,060 (excluding deductions) for the horizontal retorts and the £33,658 for the verticals.

It would also have been interesting to know something more as to the details of the costs for labour; for higher costs in connection with verticals than for machine-worked horizontals seems contrary to some of the published working experiences. In all probability, the figure for the verticals is an average one under different conditions of working, while the figure as to heavy-charge working in horizontals is more or less hypothetical, seeing that Mr. Carr's experience at Widnes has been with light charges (5 to 6 cwt.), working with hand labour, while the proposed horizontals are to be of such a size that they are to carbonize 1-ton charges in twelve hours. Then as to maintenance, in view of the fact that Mr. Carr is going to deal with ton charges, his charging and discharging machinery will, of course, have to be of a very much more substantial character than would be necessary with lighter charges; and charges as heavy as 1 ton in the initial stage sometimes claim, according to the character of the coal, a little more moving on discharging from horizontal retorts than it is thought they ought to require. We merely refer to this point as, in an instance where large horizontal retorts were used, and heavier charges than are now customary were employed, it was found that all coals could not be carbonized in the retorts on account of the trouble and strain of discharging with the works' pushing machines. For this among other reasons, it would likewise be interesting to learn how Mr. Carr arrived at the 2d. per ton for maintenance with his (including electrical plant and stoking-machines) proposed horizontal retort installation, as against 3½d. per ton for the vertical retorts. There is also the point in relation to the maintenance charge as to the relative strain on the settings with horizontal charges of such weight as 1 ton as compared with charges standing vertically. The information from Mariendorf as to the life and repairs of verticals, and statements from elsewhere, do not support a heavy charge for maintenance for the vertical retorts. Besides, both in respect of labour and maintenance costs, the lower figures for the horizontals refer to the working of 128 horizontal retorts as compared with only 40 verticals (48 if brought up to the same productive level as the horizontals). So that relatively there appears to be more room for a greater expense in association with the former than with the latter. However, we have not the least doubt that Mr. Carr will be prepared to supply the grounds for his calculations, and to defend his preference on the point of details.

In reference to working results, no figures are supplied. To a large extent they must be hypothetical for the ton-charged horizontals. Mr. Carr does not go farther than to say that the working results will be comparable with the vertical systems. He knows better than we do the character of the coal he will be using; but if we may take his tabulated figures as a guide, he only credits the horizontal working with a make of 11,718 cubic feet per ton, as compared with 12,500 cubic feet for the verticals. Nothing definite is said as to illuminating power or calorific value, only that they are better with horizontal working. But we see no reason why, if gas of 12,500 cubic feet can be obtained from the vertical working of the quality Mr. Carr desires, he should not get nearer with the horizontal retorts to the vertical production, and in this way narrow-down the difference of 782 cubic feet per ton. But on his own showing, if he carbonized the 256 tons of coal in the vertical retorts instead of in the horizontal retorts, he would have 200,000 cubic feet of gas more per day for disposal, which would produce a substantial amount of revenue in the course of the year. Moreover, on the evidence of these figures, if eight more vertical retorts were added, so as to carbonize an additional 40 tons of coal (making the consumption 240 tons of coal per day), a make of 3 million cubic feet of gas would be reached as in the case of the horizontal scheme; and we take it these eight retorts could be installed at a less cost per retort than the fortieth part of the capital expenditure shown for the verticals. If so, in addition to the saving of 16 tons of coal per day, the capital cost of the verticals per ton of coal carbonized would be reduced. It is anticipated by Mr. Carr that he will secure from his heavy charged horizontals a coke that will hold its own against vertical coke; but as to the other advantages usually claimed in favour of verticals, the Widnes report is altogether silent—the advantages of low naphthalene and low carbon bisulphide content, and the relief that these conditions afford in the general working, are not mentioned. There, again, no doubt the reply from Widnes will be that what is done in this way by verticals will also result from the ton-charged horizontals. The same in regard to the improved tar and higher yields of ammonia in the case of verticals. The latter claim, however, is not put forward so frequently now that some horizontal equipped gas-works are showing returns of 28 lbs. of sulphate of ammonia, or thereabouts, per ton of coal. There is the fuel account again. Certain vertical working discloses excellent economical fuel accounts. There is no mention of this in the report; but it will be an interesting point to see the effect of the ton charges in this direction. The relative cleanliness of working is not referred to; but to this Widnes will most probably answer that it is out for cheapness and economy.

Just one other point. There is no possibility of saying exactly what the future is going to bring forth in the way of facilitating changes in the production of gas. In the Dessau system of working in several places, there is resort to steaming for two hours towards the end of the carbonizing period, with the result that the make of gas is run-up by something like 2000 to 3000 cubic feet more per ton than the products for which Mr. Carr takes credit in his report for his projected new horizontal settings, and the calorific value of the total gas is all that is required. The future of the industry appears to be in the direction of supplying the greatest number of B.Th.U. through the gas-mains to consumers for a given price, with illuminating power altogether ignored. The horizontal retort—good as is the case that Mr. Carr makes out for it under heavy charge working—does not, and cannot, lend itself to the alternative system of working by passing steam through the charge, as is the case with, at any rate, the intermittent vertical retort. It is further economy that is sought at Widnes; and Mr. Carr is satisfied he is going to get all he requires from his present proposal—his estimate being a saving of no less than £8000 upon the present mode of working. How this estimate has been arrived at we do not know in detail; but it is one of the remarkable things of the Widnes working, even taking into full consideration the extraordinarily low capital account, that, with 5 to 6 cwt. charges and six-hour working, with hand charging and discharging, such a result should have been achieved at a cost price, with the present value of residuals, of only 4¾d. per 1000 cubic feet, and the selling prices of gas down to the lowest on record. But this result there is a desire to excel; and Mr. Carr believes that, with the increased value of residuals owing to the improved system of working, and considering the estimated £8000 additional profit, he will further reduce the 4¾d., if not wipe it out altogether, and give consumers the benefit of still lower prices. We wish him every possible success. If the Widnes Gas Department goes on at this rate, its operations will eventually have to be guided by its residuals-disposing capacity, and then the day may come when the Gas Committee will be praying the gas consumers to burn the gas, and as much as they like, for next-to-nothing—the residuals becoming the primary products, and the gas the residual. We will not, however, look too far ahead. Mr. Carr has to be warmly congratulated on his unique position at Widnes; and if he realizes his hopes with his new plant, many may be envious, but more will heartily applaud him—among them ourselves.

Bitumen Gas Explosions.

An article on this subject has been published by the "Electrician"; the joint authors being Professor W. M. Thornton and Dr. J. A. Smythe. The article is the result of an investigation they made into the cause of the disastrous Hebburn explosion.

In that case, as in the equally destructive Nottingham explosion, it was proved beyond any shadow of doubt that the cause of the occurrence was the generation of a highly explosive gas by the fusion of electric cables, and the heating of the bitumen covering. The article is reproduced by us in other columns; and it will be particularly useful to the gas industry in helping to lift from its shoulders the consequences of some of these explosions, the burden of which the industry has in the past been somewhat too ready to take upon itself. The authors give a considerable amount of information as to the generation of bitumen gas, and tell us much of its properties—more, in fact, than was commonly known before, although generally we knew something as to its nature from the investigation that Mr. W. R. Herring made at the time of the Nottingham explosion [see "JOURNAL," Vol. CXXII., p. 464]. Briefly put, what happens is this: The heat of the fusion produces from the bitumen a vapour; and it seems probable that the passing of this vapour over the highly heated cable results in the cracking of the liquid hydrocarbons. The resulting gas Professor Thornton and Dr. Smythe find, by analysis, is highly inflammable, and particularly sensitive and violent. The bitumen gas explosions that have taken place—such as the Nottingham and Hebburn ones—prove the findings of the analysis.

Lighting and Street Accidents.

Something in the nature of a phenomenon appears in the Select Committee's report on London Traffic. It seems reasonable to lay down as a good theoretical proposition that the better lighted streets are, the greater the freedom from accidents after dusk. But the statistics in the report go to show the contrary. During a given period, it is recorded that 508 fatalities occurred before sunset and 355 after, of which 339 are said to have happened where the lighting is good, four in places not lighted, and twelve in places where the lighting is "medium or indifferent." But in our opinion it ought not to be taken that these figures mean that lack of lighting is an unimportant factor. Of course, where streets and other places are poorly lighted, both drivers and pedestrians probably exercise more caution; but we rather think that the higher figures in the well-lighted streets indicate that these streets are the ones in which there is the densest vehicular and human traffic, and relatively to the traffic the figures may not be so high as they appear to be in their solid form. At any rate, the figures cannot be accepted as an argument in favour of lowering the standard of street lighting, though, for other reasons than casualties, the lighting of streets might well be improved in several respects. If the well-lighted streets had not been well-lighted, what would have been the fatality record? No one can tell; but we fear it would have been greater than the figures disclose.

The Market for Nitrogen at Our Feet.

The Chairman of the Nitrogen Products and Carbide Company, Limited (Mr. Alfred E. Barton) has fully developed views as to the prospects of the new enterprise. He told the shareholders the other day that "the price at which we can manufacture is so low that we should have the whole market of the world for nitrogen at our feet." That is rather a tall boast; and it shows a world-wide confidence. Of course, the world is a big place, and the market for nitrogen is practically unlimited. If the Company by their processes succeed in bringing the whole of the markets to their feet, we shall see other producers of nitrogenous commodities praying that a few of the markets may rise from their recumbent position at the extremities of Mr. Barton and his colleagues, and again extend their patronage to other quarters. It is through the Company's plants in Norway, which are now being largely extended, with their water-power rights, which give the Chairman and his colleagues their confidence regarding an unparalleled low-cost production. Mr. Barton states that, in the water powers owned by the Company, they have an estimated total capacity of over a million horse power; and that from this they can produce yearly an amount of nitrogen equal to the whole of the present annual production of Chili. He supplemented the information in this connection when he spoke in this wise to the proprietors: "Nitrate of soda is principally employed as a top-dressing for agricultural purposes. It is not used as a mixture; and it is quite possible we shall make a deal with an important firm, who will take our product to Chili and use it there for mixing with other fertilizers. . . . Our product will sell so much cheaper than nitrate of soda. So great is the demand on the fertilizing side of the business that we cannot fulfil the orders we get." The Company are proposing to extend their propaganda work in this country; and there is a scheme in hand for taking a number of Press representatives to Norway, so that, on the visit, they may tell the world what they think of the Company's enterprise. The Company should take especial care as to the technical information given on the occasion, as some Press representatives prepare extremely interesting matter from technical information served up to them in a ragged and, to the layman, mysterious style.

Stock Exchange Quotations.

This question has been lately raised at two meetings of gas companies—the Croydon and the Wandsworth, Wimbledon, and Epsom Companies. At the Croydon meeting, a shareholder desired to have a Stock Exchange quotation for the Company's capital. The information was given to him that the stocks were formerly quoted, but they did not appear in the lists owing to the fewness of transactions—proprietors simply keeping a tight hold over so excellent an investment. At the meeting of the amalgamated Company operating in South-West London, a proprietor sought information as to whether the new stocks had received a Stock Exchange quotation; and the reply was in the affirmative. But in both cases it was questioned whether there was any advantage in having a Stock Exchange quotation, when, simply through the paucity of transactions, a valuation was placed upon stocks below their actual title. The fact that proprietors regard their investment as such a solid one that they will not part with it, ought to appreciate rather than depreciate the value. But not so on the Stock Exchange, where business is wanted, and not stagnation Thus it comes to pass that a Stock Exchange quotation may be a positive disadvantage to existing proprietors, and to the undertakings in the event of fresh stock issues. The same thing has been noticed in the case of undertakings other than the two mentioned; and it is a pity.

The Share of the Miners.

There is no question that both miners and colliery owners are enjoying an exceptionally profitable time just now at the expense of the community; and this is strongly emphasized by what occurred on Saturday at a joint meeting of the representatives of Northumberland miners and the county coalowners. Wages of miners were advanced by $3\frac{3}{4}$ per cent.—making those of underground men and banksmen $52\frac{1}{2}$ per cent. above the basis of 1879, and those of surfacemen 42 per cent. above the standard. The last two years constitute the present period of ascending prices; and it is significant to learn that in these two years, the wages of the Northumberland men have been increased by 25 per cent. By how much have the profits of the coalowners been increased?

British Association Meeting.

The list of papers and subjects for discussion at the forthcoming meeting of the British Association in Birmingham has been issued. In the Chemistry Section, "The Future of British Fuel" will be discussed under the following heads: Use of Poor Fuel, Coke-Oven Recovery Plant, Gas and Oil Fuel, the Bonecourt System, and Alcohol as Fuel. In the Engineering Section, Professor Burstall will read a paper on "Solid, Liquid, and Gaseous Fuel;" and the Committee on Gaseous Explosions will present a report which will probably be discussed. In the section devoted to Economic Science and Statistics, Mr. Charles Carpenter, D.Sc., M.Inst.C.E., will, as already announced in the "JOURNAL," read a paper on "Trades Unions and Profit-Sharing;" and "Trades Unions and Co-Partnership" will be the subject of one by Mr. J. B. C. Kershaw.

Accounts of Water Undertakings.—It will be seen, from an announcement appearing elsewhere, that the "Analysis of the Accounts of Some of the Principal Water Undertakings of the United Kingdom" for the year 1911-12, compiled by Messrs. Wood, Drew, and Co., Chartered Accountants, is now ready. This is the thirty-second year of publication; and the nature of the work is well known to those of our readers who are connected with the management of water-works. Indeed, it may be safely stated that it is as valuable to them as "Field" is to their gas colleagues. The accounts dealt with are those of the Metropolitan Water Board for the two years ended March 31, 1911 and 1912, and of 22 Provincial water undertakings for the latter year. The number is one less than before—Liverpool being omitted. The "Analysis" is presented in the same form as its predecessors.

PERSONAL.

The many friends of Mr. W. C. Jones, the Engineer and Manager of the Brierley Hill District Gas Company, who, as recorded in the "Journal" a fortnight ago, met with a serious accident while travelling with his daughter in a motor tri-car, will be pleased to learn he has sufficiently recovered from the effects to allow of his removal from the Corbett Hospital to his home.

Mr. A. O. Jones, whose appointment in connection with the new gas undertaking for Manilla was announced in the "Journal" a little over a year ago, will be giving up the position at the end of the first twelve months' agreement, and expects to arrive in England about the middle of October. A brief account of the works in course of erection was given in our issue of May 13 last (p. 454); and it was then stated that Mr. Jones was engaged in propaganda work in advance of the gas supply. In this he has been most successful, having secured over 2900 consumers during the last ten months.

Mr. Thomas Wilkins has recently retired from the Gas-Meter Company, Limited, with whom he was connected for forty-seven years. He served them in various departments—eventually becoming Manager; and we may say that he is leaving the Company's service with the Directors' goodwill and kind consideration. During Mr. Wilkins' time, he came into close touch with many engineers of the old school—such as Colonel A. A. Croll, Mr. David Methven, Mr. R. P. Spice, Mr. Thomas G. Barlow, Mr. Robert Jones, Mr. John Clark, Mr. Geo. Wilson Stevenson, Mr. Thornton Andrews, and many others. He also had business relations with London Gas Companies now extinct—namely, the City of London, the United General, the Ratcliff, the Imperial, the Great Central, the Equitable, the Phœnix, and the Surrey Consumers. We are very pleased to be able to add that Mr. Wilkins has recently been presented with a beautiful gold lever watch from a few of his old friends, as a mark of their great esteem and appreciation. Mr. Wilkins has just returned from a month's sojourn at the seaside, and is very fit and well—although seventy years of age next month. The general management of the Gas-Meter Company, it may be mentioned, still remains in the hands of the Secretary, Mr. F. W. Church.

OBITUARY.

JOHN HORNBY.

We regret to record the death last Saturday morning, in his fifty-sixth year, of Mr. John Hornby, formerly one of the engineering staff of the Gaslight and Coke Company, from whose service he retired a few months ago on account of ill-health, as announced in the "Journal" at the time. Mr. Hornby was educated at the Warrington Grammar School, and was articled to Mr. T. A. Drew and Mr. Harry Roberts at the Widnes Gas-Works. On completing his term, he was appointed Assistant to Mr. Roberts, and held the position for eighteen months. He entered the service of the Gaslight and Coke Company in 1879 as Assistant to the late Mr. Robert Morton, Engineer of the London Gaslight Company at their Nine Elms works. He was transferred to Beckton in 1892, as an Assistant-Engineer, and remained there until 1908, when he was appointed Assistant at the Nine Elms station. In 1910, he was placed in temporary charge of Bromley, during the absence of Mr. Birkett, who was for a while transferred to Stratford. On Mr. Birkett's return to Bromley, Mr. Hornby was given the post of an Assistant to the Chief Engineer at Westminster. He was of a particularly retiring disposition; but he was very well known in the gas profession. He took great interest in technical education, and started the first class on "Gas Manufacture" organized in this country. He wrote a number of text-books, including "Gas Manufacture" which has reached a sixth edition; "The Gas Engineer's Laboratory Handbook," now in its third edition; and the series of books for the self-instruction of gas students issued under the *nom de plume* of "Mentor." Till within a few years of his death he was a Fellow of the Institute of Chemistry.

The funeral service will be held at the church of St. Emanuel, Forest Gate, to-morrow at 1.30 p.m., and the interment will take place at the City of London Cemetery at two o'clock. Mr. Hornby leaves a widow, three sons (all engaged in the gas profession), and four daughters.

Mr. Charles Buckley, who was for forty years the Magistrates' Inspector of Gas under the Leeds Corporation, has just died at his residence in Leeds, after a short illness, at the age of 72.

The death occurred on Monday last week, in his sixty-eighth year, of Provost D. M'Laurin, of Dalbeattie, of which town he was a native. He was for a long time Chairman of the Dalbeattie Gas Company.

Mr. J. Higgins, for many years Chairman of the Trim (Co. Meath) Urban District Council, whose death has been announced, was largely responsible for the construction of the water-works supplying the town.

The death occurred on the 15th inst., at Handsworth, Birmingham, of Mr. James Robson. Deceased was born in 1832 at North Shields, and in his early days was constantly experimenting with small gas-engines. He constructed several engines which were set to work in the neighbourhood of his home.

ELECTRICITY SUPPLY MEMORANDA.

Some electricians have hit on a new excuse for low charges for energy for electric heating and cooking. It is beyond denial that there would be no need for these low charges if it were not for the awkward economy of gas heating and cooking. It is argued in some quarters that it is idle for electricians to quarrel over the baselessness of some of the charges now being made, or over whether they are justified on the ground of sound finance. The people who so argue regard them as a means to an end, and that end is the "creating of a habit." The writer of "Electrical Engineering" in "The Times," we believe, was the originator of the phrase in this connection. In his notes published on July 30, he wrote: "From a purely commercial point of view, it is certain that what is most important for the moment is not to create a profit, but to *create a habit*. When the almost *gnomelike* serviceableness of electrical apparatus is at call in many households, there will be no difficulty in adjusting prices." The "gnomelike serviceableness" is good. Some of the users of undomesticated electrical appliances have, after a taste of their eccentricities and leisurely habits, wished they could send them to the nether world. There is another point. When the habit is created, it is thought there will be no difficulty in adjusting prices. In other words, the advice is to create custom on a low price; and when real success, if ever, comes, then adjust the prices to secure a profit. That is obtaining business under false pretences; and the man is not a commercial one, nor very intelligent, who thinks that the public will not see through this ruse, and will not resent the imposture. Those who are "taken in" will create difficulty in response to the electricians' mode of creating a habit, and will not quietly submit to the adjustment of prices on a profit-bearing basis.

Create the Habit.

The Half-Watt Lamp.

The half-watt hour per candle power lamp continues to claim attention. There are some electrical engineers who profess they would welcome such a lamp in the ordinary sizes to enable them the more effectually to compete with gas, as they entertain a sort of airy conviction that the aid of this lamp would enable them to recoup the loss of revenue by the dual effect of the extended business and the lower generating costs that would result from the enlarged output. Meantime, they are also trying to develop heating and cooking by means of low-priced units. The two conditions—the low-priced units, and the lamp which is expected to use only a little more than one-third of the energy required by the present wire lamps—would precipitate some electrical undertakings into a mass of difficulty. We are afraid that some electrical engineers whose views have been heard are, in their minds, stretching beyond the tensile strength the recuperating property of very low prices in conjunction with increased output in some districts of poor industrial load. The matter is not the simple one a few optimistic and light-hearted souls imagine. However, while there are some who would welcome the half-watt hour lamp, there are others who would fear it on account of the almost immediate disastrous effects on revenue, which effects, under the best of conditions, could not be counterbalanced so quickly as they would be felt by the undertakings. The fluttering, however, that there has been over the visions of disaster through the advent of a half-watt lamp, has been partially assuaged by the published information that the smallest unit lamp will not be less than of 1000-candle power, so that the ordinary metallic filament units will not be disturbed.

A Peep Behind the Scenes.

The writer of an article "The Autocrat of the Board Table" in "Electrical Industries" (who does our Electricity Supply Notes the honour of regarding them as "picturesque insolence," while oblivious of others' opinions as to what is thought of some of the matter appearing in his special articles) bids those central station engineers who are consoling themselves with the fact that the promised new lamp will only be in the high-power units not to be foolish or myopes; for when once the half-watt per candle lamp is here of the larger powers, the chances are there will be a fast slipping down to smaller units of like efficiency. A distinguished leader of the electric lamp trade has told of how behind the scenes the best of brains are concentrated on the problem of the lower unit lamp with the lower consumptions per candle. But the best of brains, working with the closest of perseverance behind the scenes, do not assure a final success. If good brains and close work were all that were needed for the solution of unsolved problems, there would be many men happier to-day than they are. However, our friend who is associated with "The Autocrat of the Board Table" article thinks the central station engineers who will best meet the ravages of the half-watt small lamps when they come are those who have forsaken the per unit tariff, and taken up the fixed annual sum one *plus* so much per metered unit. He is not alone in this view. For some of the electrical engineer optimists are of opinion that, under this tariff, there will be no difficulty in getting an increase of business that will offset the economies of the prospective lamp among existing consumers. Not one of the electrical engineers who have taken part in the controversy has suggested the raising of the price per unit. Why not? seeing that, if the half-watt per candle lamp comes, consumers would

be getting light at one-third the consumption of the best of the present wire lamps. Is it that the electrical industry realizes that the gas industry has been steadily increasing business in all directions on the old flat-rates, and so have not by any means come to the end of their competitive resources?

A Shock at Marylebone.

The Sales Department of the Marylebone Borough Council has been an unfortunate creation. Few, other than those who gave the department birth, seem to find much good in it. The Auditors (Messrs. Price, Waterhouse, and Co.) do not appear to be very favourably impressed with the finances of the department, nor with the manner in which the expenses are allocated. The local contractors have through Mr. Duncan Watson, their spokesman in the Borough Council, proclaimed the view that the department is incompetent, and charges exorbitant prices. The Chairman of the Electricity Committee (Colonel Hopkins) has resigned his position. Mr. Duncan Watson has given notice of a resolution proposing the appointment of a Special Committee to investigate the position of the electricity undertaking as affected by the latest tariffs, and as to the abnormal cost of the Sales Department in relation to new business. This is all bad enough. But upon it all comes a crushing indictment of the Sales Department in an award by Mr. Albion T. Snell over a matter in which he acted as Arbitrator. Captain Ramsden, of No. 3, Portman Square, had some work carried out through the department. On its completion, on the account being rendered, the gallant Captain considered he had been done. He disputed everything—quality of installation, workmanship, and the amount of the account. The parties judiciously decided upon arbitration by an expert, though the Borough Council have also experts in their employ. Notwithstanding this latter fact, Mr. Snell has found that the charge was not a fair and reasonable one; and, in his award, he names £48 2s. as a fair and reasonable price, or £28 8s. 6d. less than the department charged! If this difference represents the line on which the department has been working to justify its existence, the fatness of its supporting revenue will, upon this disclosure, have to be subject to a sharp process of reduction; for otherwise the department will lose the confidence of the people of Marylebone. Mr. Snell found something more—that the work had not been carried out on a suitable system; that the workmanship was not what it ought to have been; and that the installation was not in accordance with the wiring rules of the Institution of Electrical Engineers. This is all quite bad enough; but the Committee are faced not only with the painful facts that the arbitrator condemns the methods of the Sales Department, and that they and their expert officers allowed the arbitration which has resulted so disastrously to take place with the circumstances before them, but with the expenses of the arbitration. Mr. Snell's fees for the arbitration and award amount to £30 2s. 6d.; and the Arbitrator awards Captain Ramsden £26 5s. to cover the costs he has incurred for expert evidence. The department has its own costs to bear. The profit out of the £48 2s. will not go far towards wiping out these expenses. Who, too, is going to make Captain Ramsden's installation conform to the rules of the Institution of Electrical Engineers, and put it into good workmanlike order. Anyone? We prescribe for the officers—chief and otherwise—of the Marylebone Electricity Department, Mr. A. H. Seabrook's recent lectures to young men, which showed how an electricity department should be conducted on the highest of commercial planes. But what will the Institution of Electrical Engineers think of a prominent member who has a Sales Department convicted by an Arbitrator of not complying with the wiring rules of the Institution?

The Glare "Bogey."

"Electrical Engineering" speaks of the "high intrinsic brilliancy" of metallic filament lamps as a "bogey." To an effect of the high intrinsic brilliancy of such lamps, certain of the members of the International Medical Congress (as will have been seen by an editorial in our columns last week) applied the expression "Photophthalmia." Our contemporary says that "the talk of glare from metallic filament electric lamps in houses is also frequently exaggerated and wide of the mark. Even illuminating engineers are apt to forget that people in a room which is artificially lighted occupy themselves in looking at the objects illuminated, and not at the source of light itself." Quite so! Clerks in banks also occupy themselves with their books; yet in banks where electric lighting has been adopted, it is notoriously true that the clerks have suffered considerably from deterioration of eyesight since the change was made in the artificial illumination. In schools, the children occupy themselves with their books and lessons, yet Dr. Brindley James, for twenty years the medical officer to a training college for girls, stated at the Medical Congress that, since gas was disestablished and electric lamps substituted, there has been an appreciable depreciation in the eyesight of the students. Nevertheless, "Electrical Engineering" has the temerity to refer to "glare" as a "bogey." It is hard to account for the reasoning and the modes of expression of some people.

Composition of Artificial Lights.

The recent announcement as to experts in the colour composition of lights having arrived at the definite conclusion that incandescent gas-lights enjoy a nearer spectrum composition to daylight than electric lamps, has been quietly received by the electrical industry. But an indirect answer comes from the lamp and fittings department of the Siemens Dynamo works. The contemporary referred to in the preceding paragraph states that the firm of Siemens are placing on the market a Wotan lamp (with pure drawn tungsten filaments) which will give illumination of practically the same quality as daylight, at a current consumption of 1·5 watts per candle power. It will be known as the Wotan "Verico" lamp, and will, it is said, provide drapers, storekeepers, colour printers, &c., with an illumination in which colours can be matched as safely as with daylight. The announcement proceeds: "Hitherto it has been necessary to use colour screens or filters to obtain such an effect, which, apart from the high initial cost, waste such a great amount of light that the consumption per candle power reaches 3 to 4 watts. The Wotan 'Verico' lamp, therefore, is not very expensive in either initial or running costs; the colour filter effect being obtained by means of a special kind of glass. These lamps can be used with any type of reflector or shade which is not coloured. The new lamps are at present made in two sizes, of 70 and 140 candle power respectively, for voltages from 100 to 130 and 200 to 250." The statement is interesting; but we should like to have a report on the lamp by Dr. Ives or Mr. Thorne Baker. It seems the firm of Siemens have got beyond these scientific observers, if all that is said about the lamp is true, in finding a simple method of obliterating all that is in excess in the rays of metallic filament lamps that should not be there to get to the equivalent of daylight. On the showing of the experts, however, if metallic filament lamps can be made to meet the requirement in such an easy manner, then incandescent gaslight being nearer the spectrum composition of daylight, the problem of complete conversion to the equivalent of artificial daylight should be simpler still.

Childish Attacks.

The childish attacks that "Meteor" has been making on low-pressure gas lighting, and which show a well-developed liking for extreme absurdity, was illustrated in the "Memoranda" last week. Another instance is before us. In a paragraph, he refers to the recent annual report of Mr. Frank Sumner on the lighting of the City of London. He commences it by saying that "the makers of gas mantles used to claim an efficiency of 30 to 40 candle power hours per cubic foot of gas at low pressure." The "makers of mantles" have never done anything of the kind. It all depends on how their mantles are used as to the extent of the lighting efficiency obtained with them. There are ordinary incandescent burners for low-pressure gas; and there are specially constructed lamps—not merely burners—complete with all that goes to produce high efficiency from incandescent lighting with low-pressure gas—such as means for preheating both gas and air, means for obtaining proper mixtures, means for perfect regulation, means for intensifying the incandescence, and so forth—these are the lamps as they stand for which the higher efficiencies are claimed with low-pressure gas, and not the ordinary burners and mantles. However, the short-sighted "Meteor" has found out something. He says that last year the City Engineer had under his surveillance some 2321 low-pressure gas mantles "consuming 4½ cubic feet of gas per hour each; the illuminating power being 60 to 70 candles." This corresponds, adds "Meteor," for the information of those who are bad at simple arithmetic, to slightly more than 15-candle power hours per cubic foot of gas. Remarkable! Does not "Meteor" know that it is not the mantles that consume the gas, but the burners? Does he not know, too, that these figures refer to the ancient upright incandescent burners in the streets, and not to the low-pressure inverted burners that are being used under the new contract? Does he not agree that the 15 candles is not a bad efficiency for an old ordinary upright burner under street test? One further question, Will "Meteor" have the frankness to call his readers' attention to the fact that the figures refer to the old burners and not to the new, after giving such prominence as he has done to the information. Or does he prefer to mislead them, and continue to let the misconception abide? While inclined to judge from past experience, we still hope for amendment in the present and future.

The Ceramic Industries.—We have received from Messrs. Charles Griffin and Co., Limited, of Exeter Street, Strand, the first volume of "A Treatise on the Ceramic Industries," by Dr. J. W. Mellor, of the County Pottery Laboratory, Stoke-upon-Trent. Dr. Mellor, it may be remembered, recently contributed to the "JOURNAL" [see *ante*, p. 368] an article on "Refractory Materials and Temperature Tests." The subject of the volume is "Quantitative Inorganic Analysis, with Special Reference to the Analysis of Clays, Silicates, and Related Minerals." The contents of the volume are an amplification of a special course of lectures given by the author three or four years ago; but, as the work developed, it was thought best to collect all the analytical operations into one volume, and thus avoid abrupt changes of subject in the more technical parts, to be published later. The text occupies 674 pages, and contains two coloured plates and 206 other illustrations. In an appendix there are a number of tables, a list of books constituting a library on the subject dealt with, and an index of names. We hope to notice this valuable work at greater length in an early issue of the "JOURNAL." Meanwhile, it may be mentioned that the price of the book is 30s. net.

CONVEYING PLANT FOR COAL AND COKE IN GAS-WORKS.

THE following is an abstract translation of an article communicated to the "JOURNAL," on "Conveying Plant for Coal and Coke in Municipal Gas-Works," by Herr Hubert Hermanns, of Berlin.

The replacing of hand labour by mechanical working is an object at which municipal as well as private undertakings aim, not only with a view to reducing the cost of production, but also for the sake of simplification of working and independence of unskilled labour. The incentive to adopt conveying machinery is especially strong in the case of a raw material like coal, and its bye-product coke. The quantity of coal handled even in a gas-works of moderate size is so great that any economy which can be effected in conveying it appreciably reduces the prime cost of the manufacture of gas.

The conveying question must naturally be considered independently for each particular case, according to the local conditions. The quantity of material to be conveyed is also a very important factor in the question. If the coal arrives by water, for instance, special unloading plant is required on the wharf. Rapid unloading of the coal is effected by means of automatic grabs, which either put it direct into store or into filling bunkers, from which waggons for conveying it to the retort-house or store can be filled. Naturally, the number of times the coal is transferred should be reduced to a minimum, because of the crumbling and consequent loss of value which it suffers thereby. Especially in small installations it is desirable that the plant used for unloading the barges or ships should also serve for the subsequent transport of the coal; so that there will be no unloading and reloading of it between the ship and the retort-house. The author gives one example of plant by which this aim may be achieved.

The discharge of coal from railway waggons will also be effected in different ways according to the local conditions. In place of the costly discharge of waggons by hand, waggon-tips have been lately adopted in many cases. By these tips the whole load of the waggon is discharged at one operation. This method of discharge, however, becomes economical only if the quantities are large, as the capital outlay is relatively great. The method of unloading railway waggons by means of automatic grabs, which is widely adopted, cannot generally be regarded as a happy solution of the problem. The chief objection to the use of automatic grabs for unloading railway waggons is that, owing to the small width of the waggons, rapid working with them is seldom possible. Thus the working capacity of the plant is greatly reduced. Grabs are most suitable for cases where the vessels or receptacles containing the coal are large, or where the coal is stacked

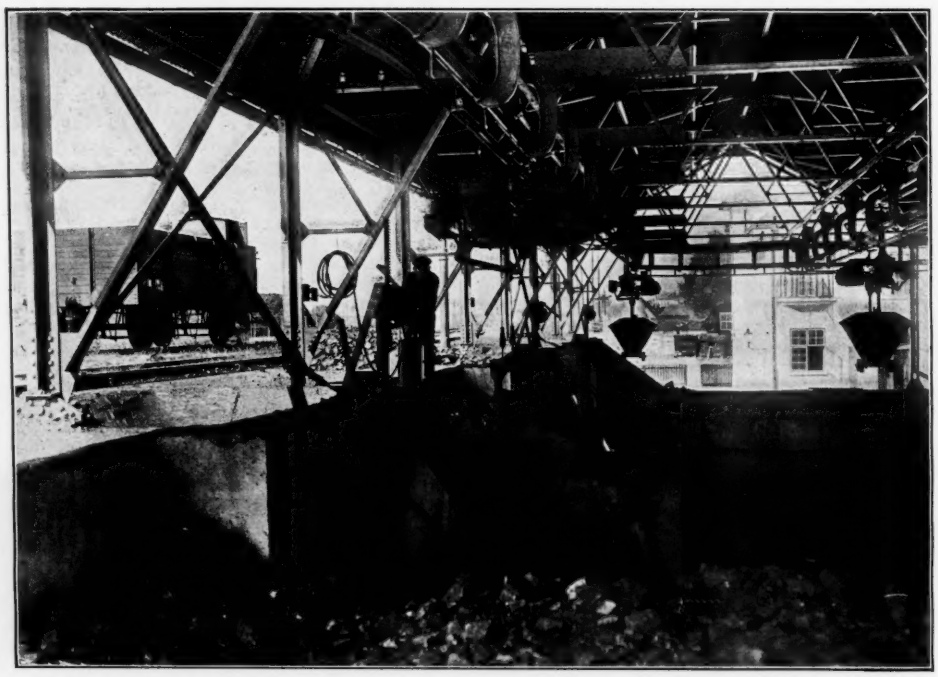


FIG. 1.—A TELPHER LINE RUNNING OVER THREE COAL BUNKERS.

in the open. Further, so far as railway waggons are concerned, if grabs are used the last portions of the load must be removed by hand. It is, however, possible that automatic grabs may be economically employed if they are also made to serve, by the use of an electric telpher line, for conveying the coal to the retort-house.

If the quantity of coal is not large enough to justify the use of a waggon tipper, generally either unloading by hand or the automatic grabs with telpher line is the more suitable. Which of the two should be adopted must depend on the particular case. For unloading by manual labour, however, the tracks on which the waggons stand for unloading should be laid out so that the coal as unloaded from the waggons is shovelled directly into either the conveying receptacle by which it is taken to the retort-house, or into a funnel-shaped bunker from which the conveying receptacles are loaded. As short a drop as possible should be allowed in the loading of the receptacles, and inclined planes should be used to reduce the shock.

The author proceeds to describe the conveying and unloading plant erected at the Agram Gas-Works by the firm of Adolf Bleichert and Co., of Leipzig. An electric telpher line is used for conveying both coal and coke; and the plant is disposed so that it is possible to work in either of the following ways: (1) The coal can be conveyed from the railway to the coal-store and distributed in it; (2) the coal can be conveyed from the railway to the retort-house; and (3) the coal can be conveyed from the store to the retort-house. The coal which arrives in railway waggons is shovelled into a loading bunker, which is at the side of the coal-store. From the bunker conveyor buckets are filled, which travel either to the retort-house or to the store. Conveyor buckets may be refilled in the store and travel thence to the retort-house, where the coal is discharged into a charging bunker.

On the opposite side of the retort-house to this coal-charging bunker is a hopper into which the cooled coke is conveyed. The hopper has two outlets in order that the coke may be drawn off either directly into the conveying buckets of an inclined elevator, which carries it to the coke breaking and sorting plant, or into the waggons of the coke telpher line, which conveys it to the coke-store. Behind the coke-sorting plant there is a short branch from the telpher line for use in lubricating and over-hauling the waggons. It may also be employed to convey screened coke to the store yard if required. This arrangement admits of the coke being conveyed from the retort-house to the store yard, from the yard to the coke-sorting plant, and from the latter to the yard.

The telpher line for conveying coal runs past the coal-store and in front of one end of the retort-house. At the other end of the retort-house is the coke-sorting plant with inclined elevator, and at the back of this is the telpher line for conveying the coke to the coke yard. The coal shovelled into the loading bunker has not merely to be conveyed horizontally, but must be elevated from the bottom of the storage shed and from the outlets of the bunker. Consequently the telpher line is provided with a patented winding gear by which vertical travel is secured.

The arrangement is shown in fig. 1, in which the telpher line supported from the framing of the roof over three loading bunkers can be clearly seen. The outer line of rail is arranged over the outlet of the bunkers in such a manner that the conveying

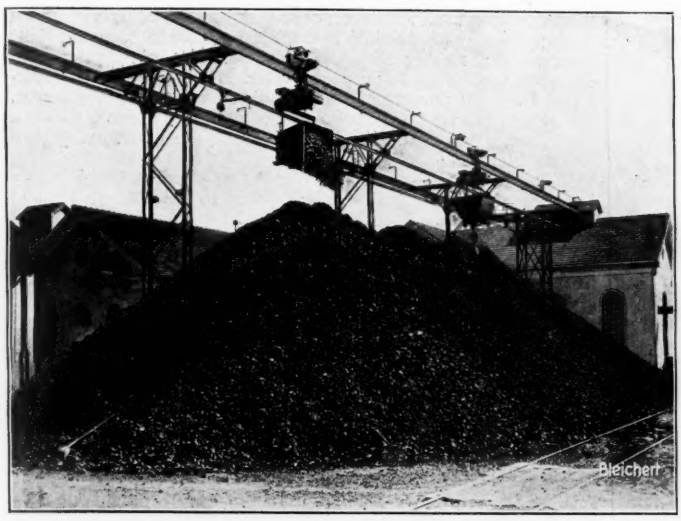


FIG. 2.—AUTOMATIC COKE DISCHARGE IN YARD.

FIG. 3.—A LIGHT TELPHER FROM BARGE TO WORKS.

buckets, after they have been lowered by the winding gear into a pit in front of the loading bunkers, are filled from the top by opening a slide which closes the opening in the bunker. The filling pits have guide-rails, which provide for the buckets being loaded exactly in front of the openings. After loading, each bucket is raised by the electric winding gear, and, according to the position of the switches, travels either to the retort-house, where it is automatically tipped into the charging hopper, or to one of the three lines of rail leading to the coal-store. The latter rails have stops by which the buckets are discharged at any required point on loosening a bolt on the carriage.

When the coal has to be transferred from the coal-store to the retort-house, the conveying buckets are loaded at any point on the three lines of rail, and are there exchanged for buckets which have already been filled by the shovel. The latter buckets are raised and are conveyed in the same way to the charging bunkers in the retort-house. The movements of the conveying buckets are all controlled from a distance by an arrangement by which they can be stopped at any position and loaded and raised again. The control may be exercised from any point. The motors are enclosed in a dust and weather-proof casing, and the current is conveyed to them from a conductor running parallel to the rail. The current is continuous, at 220 volts. The power required for the travel of a bucket has been found to be 0·8 kilowatt, and for raising a loaded bucket 5·5 kilowatts. The length of the coal-track is 1020 feet. The normal lift of the buckets is 16 ft. 6 in., and the conveying capacity is about 30 tons per hour.

The coke line is controlled from the same points, and the telpher cars are similarly provided with winding gear. Having regard to the lower specific gravity of coke, the conveying buckets have been made correspondingly larger. The length of the coke line is 295 feet; and it will convey 20 tons per hour. With both the coal and coke lines collision between the cars is avoided by an automatic blocking device, by which the cars are kept a certain distance apart by the length of the block section. The blocking device also prevents the cars running off the lines in the event of the switches being wrongly set, and also serves to detain an empty bucket arriving at the loading berth until the bucket in front of it has passed forward a certain distance. This arrangement makes for safety in working, irrespective of close observation of the conveying lines and the buckets. The automatic discharge of a bucket in the coke yard can be seen in fig. 2.

Reference has already been made to the transference of coal arriving by water from the barges to the retort-house without intermediate unloading. Such an arrangement is possible with the telpher line and has been carried out at the gas-works of the Dutch town of Assen. These works are distant about 395 feet from the bank of a canal by which the coal is brought in small barges to a sufficient height to clear an intervening street over which the buckets pass without interfering with the traffic, and to convey it to the store, where it is discharged at any desired point. On the bank of the canal a vertical framework has been erected from which a travelling beam is projected over the barges for raising and lowering the buckets in and out of the hold. The beam is drawn back into the vertical framing when discharging is not in progress, so that there is no interference with the traffic on the canal. The empty buckets are lowered into the hold, and others which have been filled by shovel are raised. The weights are recorded on an automatic machine over which the travelling carriage with the loaded bucket passes in the course of its journey. The bucket travels, according to the position of the switches, to one of two lines in the store where it is tipped by means of a projection, the position of which can be altered.

This plant being only of a capacity of 9 tons per hour, was not made to run in a continuous circle, like the Agram plant. A view of the line is given in fig. 3. Its total length is about 720 feet. Obviously the line can also be used for conveying the coke from the gas-works to the canal. The conveying buckets in this case are filled on the works, travel to the barge, and are lowered into it before discharge, so that the coke does not fall from a height.

A PLEA FOR PRACTICAL MEN FOR PRACTICAL POSITIONS.

By F. R. Parsons.

Upon one well-remembered occasion the present writer had a long and deeply interesting conversation with the late Mr. Joseph Tysoe, at the East Greenwich station of the South Metropolitan Gas Company. After a variety of subjects of mutual interest had been touched upon, we—or rather I should say he, for I have since learnt that this was one of his pet themes—introduced the topic of conversation bearing upon the heading given above.

To briefly summarize his views thereon, it will perhaps suffice to say that he was most emphatic in his opinions regarding the desirability—nay, the absolute necessity—for engineers associated with the gas industry being essentially practical men in their profession, and not mere drawing office ornaments with formulæ, figures, and theory for ever oozing out of their somewhat circumscribed personalities. Now, Mr. Tysoe was, as we all of us know, nothing if not eminently practical in his own profession; and moreover his life had led him along paths wherein he met not only the most practical of practical men, but the most unpractical of unpractical men—men who as a rule are prone to look down with pitying disdain upon others who, with only their hands and past experience to guide them, often achieve results which set at defiance all established laws having their governance defined by inelastic formulæ and figures.

The conversation referred to took place some few years ago; and on many occasions since the writer has been led to ponder over the views then expressed—views which, if applicable to the conditions then, are doubly applicable to those prevailing now. The sum and substance of these cogitations is that we have now reached, and are passing through, an era in connection with the profession of gas engineering which, being very aptly termed the mechanical era, renders imperative the necessity for practical skill and brains in the possession of men who have shown, by their practical past and practical present-day knowledge of the laws of engineering mechanics, that they are sufficiently qualified for, and are efficiently capable of, dealing in a practical way with a structural or mechanical difficulty or defect if and when one occurs, during the discharge of its various duties, and in the course of its particular functions.

Of what use, say, is all the theoretical knowledge stored within the confines of one man's brain, of what aid are all the intricate and complicated formulæ propounded by Euclid, of what assistance is a familiar and complete knowledge of all the laws, static and dynamic, to the man who is up-against, and has to correct, a wind-distorted gasholder, recurve a bulged tank, or plate a fractured engine-frame? These are practical difficulties requiring a practical brain and hand to correct—the one to work in unison with the other; the one to evolve, the other to bring into effect.

By all means let the man of theory, when the disorder is cured, come with his mathematical knowledge of the laws of strains and stresses; for then he is provided with an interesting patient—a problem suiting his analytical proclivities. He doubtless will (if the phrase be permitted) hold a post-mortem examination over the patient, and diagnose the source of trouble by means of his beloved and infallible scientific data; only to discover, what per-

haps might have been discovered earlier, that the patient suffers from long-standing internal structural weakness which, according to his light, and viewed by the light of recent events, it was the greatest wonder in the world had not developed before!

Now do not hastily infer that the writer would decry the usefulness, or belittle the efforts, of theoretical men of this class or in this direction. They are recognizedly as requisite in their own sphere as are practical men in theirs. But what he is driving at, and desirous of impressing upon his readers, is the need for drawing a distinction between men who know how to locate a wrong and correct it, and those who only concern themselves as to the whys and the wherefores of its happening. When the safety of a gasholder is imperilled and a town's lighting is at stake; when the danger presents itself of having to draw the retorts and stop the making of supplies at a critical moment—then it is an engineer's immediate concern to get back again to a condition of *status quo* with as little possible delay and inconvenience to all concerned. Precious little he cares at the moment for going into causes—effect is his primary concern. He is well-content to leave the former to the analytical minds of his theoretical brethren, until such time as he can regard himself as well outside the danger zone.

Supposing for a moment one reviews an ideal engineer's attributes. First of all, then, an engineer's mind must be so developed that it is quick to act, and his hands prompt, capable, and decisive, in order to follow the dictates of his brain. But this can only come through a thorough and complete grounding in something more than the practical rudiments of the profession. It must follow a training with hammer and chisel and file. It must be the fruition of years of personal contact with mechanical problems in their every shape and form, in conjunction with a progressive study of the evolution of machine-created methods. It must embrace a period when he has made the leading of men not only a study but an actual feature, in order to have become possessed of the amount of tact and discrimination and self-confidence that is required to imbue those under him with the same feelings, and inspire them to follow where he leads. He must be able to move along lines which have a clearly defined end; be unwavering in purpose, decisive in action. He must be possessed of sufficient initiative to be alone competent to formulate ideas; yet not too conservative in them to refuse co-operation when arranging details. And, finally, he must be patient, without being too easy; firm, without being overbearing; particular, without being fussy; officious, without being dictatorial; and friendly, without ever sacrificing dignity.

Now, you may ask, where is one to look for this paragon of all the virtues, or, on the other hand, where the engineer who dares hope to aspire to the possession of these qualifications? At the outset, it may be as well to admit that in a general way the quest might prove as unproductive as it is improbable to expect to find an individual who could or would lay claim to such lofty attainments and possessions. What has been attempted, however, has been but to create a hypothetical engineer in order to have a model whereon we might show off to the best advantage the virtues and qualifications which should clothe its living prototype, and also to use it for the purposes of comparison when reviewing the many individualities whom we now find posing as practical engineers.

Again, do not think I am unduly harsh; do not imagine I am an aggrieved individual, or that I have any particular axe to grind. I am but writing of view-points as they have presented themselves to me through a number of years of intimate knowledge of the profession indicated.

Just a word on an aspect of the case which has a direct and important bearing upon what has already been said. It has been suggested that only those who have had practical training can expect to become successful and efficient engineers. It frequently devolves upon the writer to have to unravel the tangled intricacies and probe to the depths the hidden meanings conveyed by engineers in their plans and specifications. And how vague and bewilderingly perplexing they can sometimes be! But the point is this. To one who is accustomed to these duties, it takes but little time or ingenuity to discriminate between the wishes and requirements of the practical engineer and the one who is lacking a practical training.

In the one, you can follow the practical mind in the designing of something that, given the facilities, its author could himself make. In it, there would be no attempt to produce, for production's sake, a pretty picture when a plain, understandable working drawing would serve better to show its intent. There would be found no cored holes which would be difficult or impossible for a working moulder to locate; no machining in inaccessible places, or necessitating the services of a specially built machine; no departure from recognized standards in relation to flanges, holes, brackets, webs, or curves; no apparent desire to create an innovation of design in order that it might go down to posterity as the hall-mark of that engineer; and, finally, no stringent or impossible regulations and conditions relating to the quality of the material used thereon, and which an engineer with only half his faculties about him should know full well could not be honestly complied with at the price which is estimated to be expended upon the contract.

In the other, innovations and anomalies are found—both structural and detailed, which hit one in the face at the first glance. Standardization, structural and productive economy have been sacrificed on the high altar of novelty and inexperience. Holes are shown that would require drills of the elasticity of a coil spring to insert. Machined faces are indicated which violate all known laws of mechanical operations. Bolts to secure a light unimportant member are specified of a size sufficiently strong in shearing section to lift a steam-roller. Essential details, indispensable to all concerned, are conspicuous by their vagueness, ambiguity, or else total absence; and immaterial ones, which a first year pupil could fathom at a glance, are given every view imaginable.

Is the reverse to be expected when we consider that in many instances the designing is wholly deputed to theoretically-trained draughtsmen, who, though they may be eminently qualified to produce something pretty, and neat, and workable—on paper!—yet could not for the life of them instruct a novice how to proceed to bladder a main and put in a service, nor yet scrape to a fit a leaky disc-valve?

Be it remembered, this lamentable inefficiency is accentuated rather than relieved when the drawings and specifications are passed on to the chief for examination, checking, and approval. For unless he is a practical man, and can clearly go over the constructional details, and in his mind's eye see the completed project, all errors and anomalies escape him, and with a flourish of the pen he forthwith sets the seal of his own and his subordinates' incompetence at the bottom right-hand corner of the drawing.

What is there more familiar than the advertisement one sees inviting applications for an engineer, the chief stipulations being that applicants must be "thoroughly qualified, with first-class training and experience"? Now what constitutes qualification, what is meant by a first-class training, and what form of experience is held necessary? Dealing with these seriatim, one is often driven to the conclusion that all that is necessary in the first is that the applicant be the son of his father. In the second, that he must have scrambled through with honours in some "Technical Guild." In the third, that he must have served a brief period in the drawing office with occasional visits on the works in order to report progress to his chief, and to criticize the practical methods of the men who are supposed to be beneath him both in intellect and knowledge.

This is not sarcasm; it is too near the truth for that. The writer remembers visiting a gas-works expressly to see the engineer on a matter involving the details of a contract. He was informed, however, that the chief was away. Could he see his assistant, was the next question. Yes, it was supposed that "Mr. So and So" would be found somewhere on the works, seeing that his office was unoccupied. Eventually the writer was introduced to a much-begrimed, perspiring individual, clad in oil-soaked, nondescript-colour overalls, with hands and arms black with tar, who was engaged in the unenviable occupation of assembling the parts of a tar and liquor pump which had given-out. This was the assistant engineer! "All my fitters being busy outside, somebody had to get her to work again," was his simple but eloquent explanation. You see, he had been through the shops! *Verb. sap.*

Another similar incident will perhaps serve to illustrate more lucidly than pages of print what is intended to be conveyed in this article. Calling upon another engineer one day, the writer was taken to the engine-house, where he found the whole staff, from the chief downwards, holding a grave and anxious consultation over a refractory gas-engine. Inquiring into the cause of the trouble, the writer learnt that the attendant who had usually been responsible for the running and up-keep of the engine had, through some cause or other, been summarily dismissed the previous day, and the engine's present refusal to start was by a general consensus of opinion attributed to an act of spite—something about it having purposely been displaced or altered by him in order to create a vexatious delay.

At the moment the engine was being pulled around by three or four lusty, perspiring stokers, who from their general appearance and demeanour were without a doubt mentally consigning the engine to unnameable regions. Deeming it futile under the circumstances to approach the chief upon the matter which had brought him there, the writer made a casual inspection of the engine, and in passing unobservedly made a certain slight alteration to a lever. "Now try her again," he suggested. Just imagine the feelings of all concerned when the result was the reverse of what was generally expected. As the actors in this little comedy filed out, the chief whispered to the writer a very obvious question. "Do you usually expect an engine to start with the gas-valve closed?" was the answer he received.

Now these simple illustrations serve to convey, even if in a homely fashion, what the writer's opinions are regarding this all-important question. To summarize very briefly what has already been said, and to crystallize the sentiments therein expressed, it is only necessary to again emphasize the fact that from his point of view (and surely there is little conflict of opinion upon this) it is imperative in the interests of efficiency, economy, and progress that only practically trained men should be in positions involving the manipulation, care, management, and upkeep of the various mechanical agencies and plant found in a modern gas-works.

Eastern Counties Gas Managers' Association.—We learn from the Hon. Secretary and Treasurer (Mr. Joseph Davis, of Gravesend) that the autumn meeting will be held in the National Gas Exhibition Buildings at Shepherd's Bush on Friday, the 10th of October. Further particulars of the meeting will appear in due course.

THE DESIGN OF A GASHOLDER.

By ENGINEER.

An article by the writer appeared in the issue of the "Journal" for Dec. 31 last (p. 1039), in which he formulated certain working stresses, minimum thicknesses, and various recommendations for holders of different capacities. It would be of interest to many, and of value to some, to go step by step through an actual design of a gasholder, showing how to conform to the rules and particulars given in the article referred to, and also how the principal features in the design conform to the medium between practice and theory. Each step will be made simple, and no attempt will be made to prove formulæ, &c. Effort will be made to avoid treating the matter in too academic a manner—in fact, it will be noted how in many cases the theory is subordinated to practical considerations. If the reader wishes to study the theory of the subject in greater detail, he is referred to Mr. F. S. Cripps's book on "The Guide-Framing of Gasholders," to which work the writer wishes to acknowledge his indebtedness for the theoretical treatment of that portion of the article, and for many of the formulæ employed.

Type of Holder.

The type adopted is one which lends itself to theoretical treatment, and one which has been found in practice to be sound and economical in construction—namely, the "multipost" type, consisting of closely-pitched standards, with horizontal struts and diagonal bars or rolled sections for the tension members. The keynote to successful and economical design is simplicity. This ensures generally the maximum of material with the minimum of labour, with the material well distributed—waste being reduced to a minimum.

Capacity, and Two Possible Structures.

The required capacity of the holder, based on 16 to 18 hours' storage, was 1,750,000 cubic feet. This amount of 16 to 18 hours of the maximum day was taken for this particular works, as 25 per cent. of water gas is employed, with plant capable of sending out 45 per cent. It should be noted that the old rule of 24 hours' supply or more is never adopted now in modern works. In addition to the stand-by of water gas, the load curve is levelling-up, not only during one actual day, but during the whole year.

The ratio $\frac{\text{yearly make}}{\text{maximum day}}$ at one time was taken at 200. The writer now takes 230 as the divisor, as in works with which he is associated the figure varies from 225 to 275.

In a holder of this size, there are two propositions worth considering.

(1) A four-lift holder with a tank about 155 feet in diameter, and lifts about 26 feet deep.

$$\text{Ratio } \frac{\text{total height}}{\text{diameter}} = 0{\cdot}64 \quad \frac{\text{height of top lift}}{\text{diameter}} = 0{\cdot}18.$$

(2) A three-lift holder with a tank about 160 feet in diameter, and lifts about 32 feet deep.

$$\text{Ratio } \frac{\text{total height}}{\text{diameter}} = 0{\cdot}58 \quad \frac{\text{height of top lift}}{\text{diameter}} = 0{\cdot}21.$$

Assuming that there is room for the larger diameter (excavation limit about 180 feet), we see that in case (2) the first ratio is small —*i.e.*, the holder is rather shallow, although each lift would be rather deeper than in the first proposition, resulting in a slightly greater top-lift pressure.

If in the second case we make the diameter less and the height more, we get beyond the advisable depth for such a diameter, for economical reasons.

The ratio $\frac{\text{height}}{\text{diameter}}$ of top lift is only very rough as a guide to pressure thrown. A rule which is more accurate, deduced by the writer, is as follows, working from first principles:

Pressure is proportional to $\frac{\text{weight of lift}}{\text{area}}$. The weight consists mainly of top and side sheets, which form two-thirds of the total weight of such a holder as that we are considering, the other one-third depending on both dimensions, height and diameter.

If D = diameter and d = depth

The weight of the top lift is nearly proportional to the area of the sheeting

$$= \frac{\pi}{4} D^2 + \pi \, D. \, d.$$

$$\text{and the area} = \frac{\pi}{4} D^2$$

therefore the following gives a *comparative measure* of the pressure thrown.

$$\frac{\frac{\pi}{4} D^2 + \pi \, D \, d.}{\frac{\pi}{4} D^2} = 1 + \frac{4d.}{D.}$$

By using this simple formula, we get in the first case (four-lift) 1·74, and in the second case (three-lift) 1·63, or the top lift of the latter holder would give $\frac{11}{174}$, or 6·3 per cent. more pressure than the top lift of the former. When we work out the total comparative weights, we shall have an opportunity of seeing how near to the actual result we get.

It may be noted that if we take the ratio of $\frac{\text{height,}}{\text{diameter}}$ the increase of pressure should be $\frac{3}{18}$, or 16·7 per cent.

Type of Tank.

Keeping in mind the two alternatives, trial holes should be taken to ascertain the type of tank to employ—viz., steel, wholly or partly above ground, or masonry, whether brick or concrete, or the two combined. It should be remembered that a good foundation is absolutely necessary, not only to ensure the satisfactory working of the holder, but to ensure economy in construction. If good ballast can be obtained from the subsoil, it would pay to get it, and use it in the foundations or in a concrete tank.

In this case, the result was an excellent ballast foundation at a depth of about 8 feet, with water slightly below this level, which was apt to become very troublesome at a depth of much less than 30 feet. In a tank of this size, there is no doubt that a masonry tank would be cheaper with normal foundations; but owing to water trouble, which would have been serious and expensive at the depths proposed, it was decided to utilize the ballast below 8 feet for the foundation work, and build a steel tank.

In comparing the comparative costs, we must add to the cost of the steel tank: (*a*) The foundations; (*b*) the lengthening necessary for the standards; (*c*) the framing for supporting the crown is likely to be more expensive owing to there being no "dumpling." However, having settled in this case to have a steel tank, we must consider the two propositions before us. The shallow appearance of the three-lift would now be obviated, as we should have 23 feet of tank showing above ground.

Calculations for Tank Plate Thicknesses.

The thickness of the side tank sheets is obtainable from the rule $P.D = 2 f t e$

where P = pressure due to water in pounds per square inch
D = diameter of tank in inches
f = working stress = 5½ tons to the square inch
t = thickness of plate in inches
e = efficiency of riveted joint.

In the four-lift proposition, the thickness of the bottom row of side sheets = $\frac{15}{16}$ inch; in the three-lift proposition, the thickness of the bottom row of side sheets = 1$\frac{1}{8}$ inches.

This is by taking the maximum pressure as that due to water 1 foot above the base.

$$\text{and } \therefore \; P = \frac{62{\cdot}5}{144} \times (d - 1) \text{ where } d = \text{depth of tank in feet.}$$

The bottom 1 foot of pressure can be considered as overcome by the stiffness of the bottom curb and support given by the riveting. Do not use the centre of the plate or two-thirds of the plate rule. It would be just as logical to design the bottom plate for the static pressure at half or two-thirds of the way down the whole tank. We take the efficiency as 90 per cent. for treble-riveted butt-joints. The side sheets would vary from $\frac{5}{16}$ inch at the top; the two tanks consisting of six and seven rows of plates respectively. Bottom sheets, outside row = ½ inch, and others $\frac{3}{8}$ inch thick.

Relative Weights of the Two Propositions.

We must next consider the economical comparison of the two types. The estimated weights are appended.

	Four-Lift Holder. Tons.		Three-Lift Holder. Tons.
Steel tank	336	..	405
Framing for resting crown	52	..	63
First lift	128	..	146
Second lift	68	..	80
Third lift	68	..	74
Fourth lift	60	..	—
Guide framing	230	..	223
Total	942	..	991
Tank and framings	618	..	691
Floating gasholder	324	..	300

To these weights should be added the ladder, handrailing, and the inlet and outlet pipes; but as these would be nearly equal in both cases, we will omit them. In order to get these weights of guide-framing, it is necessary to set out the tank and lifts diagrammatically, and show thereon the proposed number of standards, noting that the chords between the centres of the standards—*i.e.*, the horizontal struts—do not "foul" the outer lift. With closely-pitched standards, this will not happen. In the four-lift case, the

centres of the standards would be on a circle about 500 feet in circumference, and 515 feet in the other case.

The table then shows the distance apart for 30 and 28 standards respectively:

	Four-Lift. Ft. In.		Three-Lift. Ft. In.
30 standards.	16 6	..	17 0
28 ,, ...	17 9	..	18 3

So we see that for 28 standards, we save two, without making the struts excessively long, and at the same time only slightly decrease the amount of bracing.

Although there is little difference in the propositions, 28 was decided on. Working, therefore, on these figures, it will be seen that the four-lift holder shows a saving of about 50 tons, or some £900, looking to the fact that the lighter total contains more floating weight, which is dearer per ton than the tank and framings would be.

The top-lift pressures would be 32-10ths and 34-10ths respectively; but the smaller amount could be made equal to the larger by the thickening of sheets or sections by 8 tons in all, at a cost of about £130 for material only. The thickening of the top-lift side sheets from 10 to 8 gauge would just give this extra pressure. It may be noted here that the difference between 32-10ths and 34-10ths is 6·3 per cent., the same as the approximate formula given earlier. A further small saving of £120 or so can be made in the tank excavation and concrete foundation by adopting the smaller diameter; so that it is clearly seen that £900 can be saved. Therefore, a four-lift holder was decided on.

The total pressure is found to be as follows (with the top-lift sheets thickened): Top, 34-10ths; second, 17-10ths; third, 16-10ths; outer lift, 14-10ths—a total of 81-10ths. It is rare that a holder of a large capacity gives sufficient pressure with its top lift alone; and here we should rely on the first two, giving 51-10ths (a very suitable one), above which boosting must be resorted to. It is worth considering also that the four-lift holder has an advantage in the matter of pressure, inasmuch as nearly three-quarters of its capacity can be delivered at a minimum pressure of about 50-10ths. In the three-lift, only two-thirds could be so delivered—a difference of about 150,000 cubic feet. The writer is aware that he has given weights complete without showing how they are arrived at. This, however, is done so as to avoid dealing with two sets of figures; and now that the method of settling size and proportions has been dealt with, attention will be confined to that one only.

Fig. 1 shows the section when all the lifts are landed. The 10-inch rest block is inserted to give good-sized bottom rollers. The 3-inch gradation of the top curbs is to allow room for the carriages, and to give them better shape.

It will be noticed the difference in lift diameters is 2 ft. 6 in., or 1 ft. 3 in. upon each side. This is to permit of the use of a 10-inch channel, which makes riveting and general working much easier, and more clearance when the holder is working than with 8 inches. It is much stiffer, and better able to keep the cylindrical shape of the holder when under wind pressure.

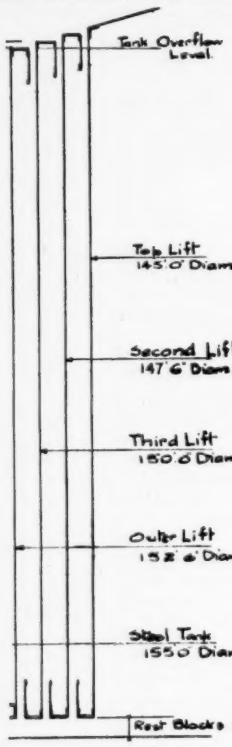


Fig. 1.

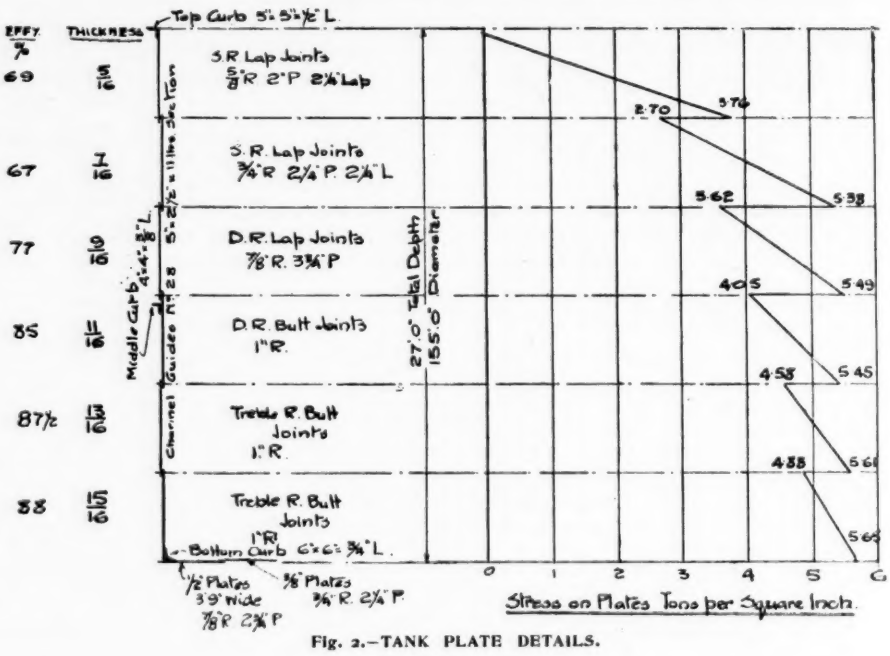


Fig. 2.—TANK PLATE DETAILS.

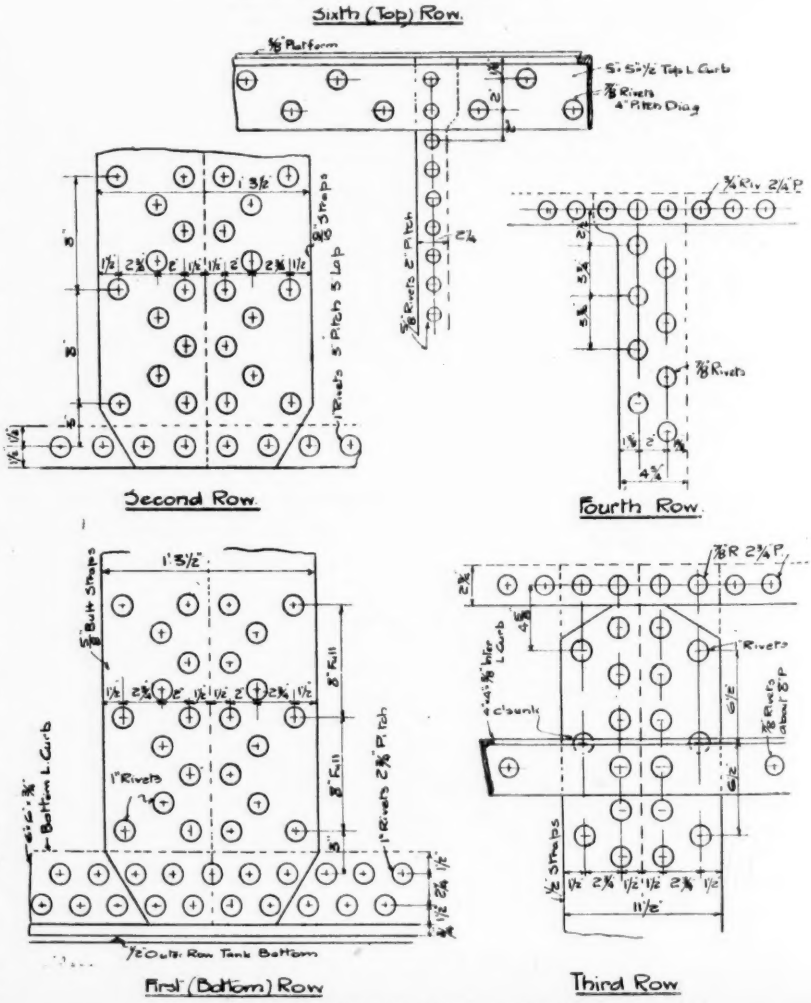


Fig. 3.—DETAILS OF TANK RIVETING.

Rise of Crown.

The next matter to settle is the rise. Some hand-books give 5 per cent. of the the diameter; but the writer prefers more, as the strain on the top sheets and curb is thereby lessened, and the dome takes a better shape. In this case, 9 ft. 6 in. was adopted (6·6 per cent.), making the radius of the crown about 282 feet.

The Tank.

As before calculated, the bottom side sheets are $\frac{15}{16}$-inch thick. The top row is $\frac{7}{8}$-inch, and the remaining sheets, with the vertical riveting, is shown on fig. 2, which gives, in addition, the method of jointing and the efficiency of all joints. Adjoining this diagram is one (fig. 3) of stresses from top to bottom. Some of the chief joints are also given in detail.

An examination of these joints and diagrams will suffice to show the interested reader how the efficiencies are arrived at, and to furnish him with a mental view of the whole tank. They will also enable one to get a complete estimate of the weight. The diagram of stresses in the tank plates shows how practical considerations affect the thicknesses of the top sheets, and how wasteful they are from a purely theoretical point of view.

(To be continued.)

GASEOUS EXPLOSION CAUSED BY THE ELECTRIC HEATING OF BITUMEN IN CABLE TROUGHS.

By Professor W. M. Thornton and Dr. J. A. Smythe, of Armstrong College, Newcastle-on-Tyne.

From the current number of the "Electrician" we reproduce an interesting report, by the above-named gentlemen, as to their investigations on the subject of a recent explosion at Hebburn-on-Tyne. It is prefaced by the following summary: A case of explosion through the accidental heating of bitumen in cable troughs led the authors to investigate the action of heat upon bitumen. Heat was applied under four different conditions; and the resulting gases were examined. The conclusion is reached that bitumen gas, however produced, lies between marsh gas and coal gas in its inflammability.

From time to time explosions have occurred in electric-cable junction-boxes in streets, which have been in many cases attributed to the ignition of coal gas leaking from adjoining mains. Since in every such case there must have been leakage of current in order to ignite the gas by heat or sparking, a more probable cause, which does not appear to have been fully considered in the laying of electric cables solid in bitumen, is that the latter has been overheated by the developing fault, and that an explosive mixture of air and the gases given off has been ignited by the same agency.

Evidence of cause has been rarely conclusive; but in the case of a recent explosion at Hebburn-on-Tyne, by which two houses were wrecked and two lives lost, the cause was admitted to be, after a very thorough examination by representatives of the electrical and gas undertakings, the ignition of inflammable vapour given off in the destructive distillation of bitumen in the wooden trough used. It appeared, therefore, worth while to examine in detail the production and constitution of bitumen gas, and its inflammability when mixed with air in various proportions.

Destructive Distillation of Bitumen.

The bitumen selected was the Trinidad pitch from the cable trough at Hebburn, adjoining the damaged part. The sample looked fresh and in no way altered by its stay of eleven years underground. Its specific gravity was 1·24; and it yielded on proximate analysis:

	Per Cent.
Moisture	0·8
Volatile matter	57·7
Fixed carbon	7·0
Ash	34·5
	100·0

The organic gas-producing constituents of Trinidad pitch are essentially hydrocarbons, mixed with organic compounds containing sulphur and nitrogen. An analysis, calculated on the ash-free material, may be quoted as representing the composition of the bitumen used in these experiments: C = 82·3, H = 10·7, S = 6·1, N = 0·8 per cent.

The destructive distillation of the bitumen by heat gave results varying within wide limits, both with respect to the yield and the composition of the gases evolved. In every case, mixtures of gaseous and liquid hydrocarbons were formed; and the sulphur and nitrogen of the bitumen entered, probably to a large extent, into combination with hydrogen, producing gaseous hydrogen sulphide and ammonia.

The distillation experiments fall into three groups, according to the conditions under which heat was applied:

(1) Slow distillation from a glass flask, the temperature rising gradually to a dull red, produces a gas very rich in methane [see analysis A]; and at the same time a considerable quantity of liquid hydrocarbons is formed. In one experiment 50 grammes of bitumen yielded 29 grammes of solid cokey residue, 13 grammes of liquid hydrocarbons, 2 grammes of watery ammoniacal liquor, and 6·75 litres of gas. The weight of the gas (by difference) is 6 grammes, which corresponds closely to the weight, 5·8 grammes, calculated from the volume and density of the constituent gases. The percentage yields in this experiment are:

	Per Cent.
Residual coke	58
Ammoniacal liquor	4
Liquid hydrocarbons	26
Gas	12*
	100

* 135 cubic cm. per gramme of bitumen.

(2) Distillation at higher temperatures, from a hard-glass tube under such conditions that the vapours evolved during the later stages passed over the heated coke produced in the earlier stages, improved the yield of gas, at the same time profoundly altering its composition. Two experiments performed under strictly comparable conditions gave the following results:—

Experiment.	Residual Coke.	Liquid Hydrocarbons and Ammoniacal Liquor.	Gas Yield per Gramme of Bitumen.
No. 1	56 per cent.	20 per cent.	200 cubic cm.
2	58 ,,	22 ,,	194 ,,

The chief influence of this method of distillation on the composition of the gas is to greatly increase the amount of unsaturated hydrocarbons (olefines) at the expense of the saturated hydrocarbon methane [analysis B].

(3) Very rapid heating of the bitumen, under otherwise similar conditions to the above, produced tarry matter, and furnished a gas in which hydrogen had increased greatly in volume at the expense of methane; the olefines being but slightly affected [analysis C].

(4) Finally, the study of the conditions at Hebburn showed that liquid hydrocarbons had not been formed to an extent approaching in any degree that which might be expected from the experiments just cited. As there was evidence that the vapours from the electrically-heated bitumen had been forced to traverse a length of several feet of highly-heated bitumen coke, it appeared probable that "cracking" of the liquid hydrocarbons had taken place, with consequent augmentation of the gas volume. This was tested and confirmed in the following manner: The liquid hydrocarbons prepared from the bitumen in former experiments were dried and distilled gently in a tube $\frac{3}{4}$ inch diameter over a length of 3 inches of heated bitumen coke. Large volumes of gas were thus generated; the yields being inversely proportional, apparently, to the velocity of distillation. The mean yield of gas in three concordant experiments was 500 cubic cm. per gramme of oil. This was increased to 900 cubic cm. in another case by very slow distillation.

The composition of the gas is given in analysis D. It contains nearly 30 per cent. of unsaturated hydrocarbons. In addition to his gas, a certain quantity of light oil (roughly, 50 per cent.) is also produced in the cracking process. This oil, like the gas, shows a high percentage of unsaturated hydrocarbons, the iodine values of the original and cracked oil being 33 and 54 per cent. respectively.

Composition of Bitumen Gas.

Four samples of bitumen gas, prepared by the methods indicated above, have been analyzed. A is the gas prepared by gently heating in a flask, the gases and liquids not coming into contact with incandescent solid material; B was prepared by the tube method, in which some cracking takes place; C was similarly prepared, but the heating in this case was very rapid; D is the gas obtained by cracking the liquid hydrocarbons.

Hydrogen in the gases was directly determined in C and D only. The explosion data for the four gases, after absorption of all but nitrogen and saturated hydrocarbons, show that the latter are essentially methane. The hydrogen content of A and B is thus zero, or very small—probably not greater than in D. The volumes of oxygen and air required for complete combustion of the gases are calculated from the analyses on the assumption that the olefines are represented only by ethylene (C_2H_4). The experimental determination made in the case of gas D gives a value sensibly higher than the calculated, from which it may be inferred that the olefines contain homologues of ethylene. A special determination of acetylene (C_2H_2) made in gas B [for the analysis of

which we are indebted to Mr. W. Thompson] gave the value 1·5 per cent.

—	A.	B.	C.	D.
Methane or marsh gas (CH_4)	80·0	59·6	43·1	59·2
Olefines or unsaturated hydrocarbons	7·1	18·4	20·3	29·8
Carbon monoxide (CO)	None	2·6	2·1	2·4
Hydrogen	..	..	20·6	2·4
Hydrogen sulphide (SH_2)	5·4	6·4	8·8	0·8
Carbon dioxide (CO_2)	3·6	4·1		
Oxygen	1·2	2·6	0·3	0·8
Nitrogen	2·7	6·3	4·8	4·6
	100·0	100·0	100·0	100·0
Oxygen required per c.c. of gas for complete combustion	1·89 c.c.	1·85	1·65	2·10 2·43
Air required per c.c. of gas for complete combustion	9·0 c.c. (cal.)	8·8 (cal.)	8·0 (cal.)	10·0 (cal.) 11·6 (found)

Inflammability of Bitumen Gas.

The analyses of the gases derived by the destructive distillation of bitumen are thus convincing proof of their highly inflammable nature. The inflammability of gaseous mixtures has been hitherto estimated chiefly by the lowest percentage of combustible gas in air which can be ignited explosively. A method has recently been described by one of us, by which the inflammability of a gas may be measured with a high degree of accuracy at all percentages between the upper and lower limits. An electric current is broken between metal poles forming a momentary arc in the mixture, the effect of which depends on the voltage, the material of the poles (in this case iron), and upon whether the current is continuous or alternating, in a manner which has been worked out elsewhere.* There is a certain current which just fails to ignite the gas by its break-spark, although this may be very large and brilliant in high and low percentage mixtures, especially when the current is alternating. There is found to be in every case a lower limiting percentage of gas in air which cannot be ignited explosively by any kind of spark or arc. As the percentage of gas in the mixture is increased, the least igniting current falls, and in the case of continuous current soon reaches a sharply-marked minimum. It then increases in exact proportion to the increase of the percentage of gas, until the upper limit of inflammability is approached, when the rate of increase becomes very rapid.

The figure contains the result of observations made in this way, first with the complete gas A, next with the hydrogen sulphide, carbon dioxide, and olefines removed. It will be seen from the analysis that the remaining combustible gas is 95 per cent. methane. In curve B, there is less methane and there are more olefines, but higher percentages of nitrogen and carbon dioxide. The upper limit is clearly much higher. The lower limit is also about 0·5 per cent. higher, which is not to be expected from the known influence of olefines in increasing sensitiveness to ignition, but is possibly explained by the increase in the inert gases.

Curve C has a perceptibly lower limiting current over a long range, and is midway between B and coal gas. Since gas C contains 20·6 per cent. of hydrogen and B none, while coal gas has 54 per cent., the intermediate position of curve C may possibly be the effect of the hydrogen. The reason why this curve bends upwards at 20 per cent. is not very clearly indicated. Apart from its sensitiveness to ignition, ethylene requires half as much oxygen again as methane for perfect combustion; and the rise in the proportion of olefines to methane might be the cause of the lower value of 22 per cent., as against 25 per cent. for gas B.

Curve C differs from curve D chiefly in the much larger percentage of hydrogen; and, since in other respects—for example, the ratio of olefines to methane—it is not unlike it, the influence of hydrogen in extending the upper limit is clear.

The whole problem is, however, too complex to be fully solved with the present data. The thermal side of the question has not been considered here; and the relative heats of combustion of the constituent gases may play an important part in fixing the upper as well as the lower limit.

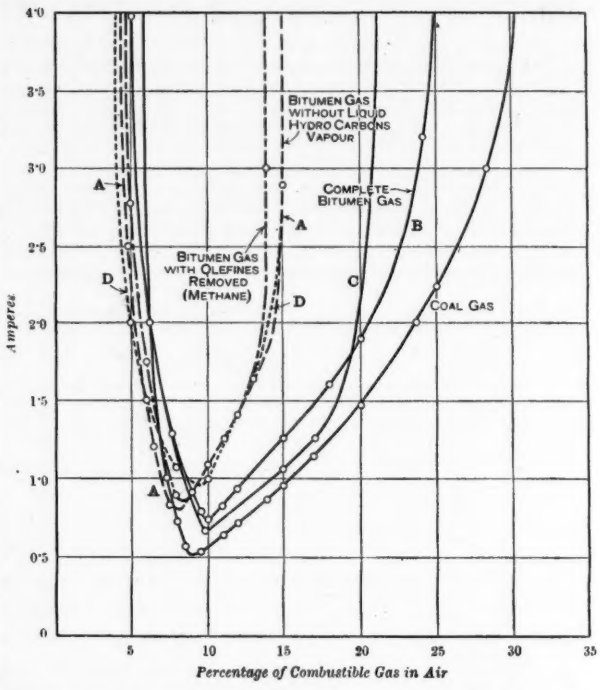
In the present case, the variation of the lower limit is small (it lies between 4 and 5 per cent. for the bitumen gases); while the upper limit varies from some 14 to 25 with the present method of ignition.

According to the electrical experiments, therefore, bitumen gas, however produced, falls between marsh gas and coal gas in its inflammability—approaching the former in sensitiveness when produced slowly in a flask, and the latter when produced rapidly over its own hot coke. There is a general agreement between the curves and the analyses, one interest of which is in the support which it gives to the electrical method used of testing the relative inflammability of gaseous mixtures of any desired composition.

The Hebburn Explosion.

The conditions under which this occurred were certainly very exceptional, and were probably unique in the chain of events which led to the destruction of the houses. The continuous-current mains had vulcanized bitumen insulation of good quality;

* "The Ignition of Coal Gas and Methane by Momentary Electric Arcs." See "Transactions of the Institute of Mining Engineers," Vol. XLIV., Part I., pp. 145-174.



The Ordinates are the Least Currents which Ignite the Gas at Break. [The letters refer to the analyses in the third section of the report.]

but, owing to a combined dip and bend in the run, had become displaced one above the other at the bend. The covering tiles at this point did not quite meet—allowing moisture to diffuse-in from the surrounding ground. The wooden cable trough was laid a few inches from the foundations of the houses, which consisted of large stones uncemented together, and so loosely laid that there were many wide passages between them, through which it was eventually found that hot, sooty vapours had passed in large quantity into the space beneath the flooring boards of the ground-floor rooms. The total volume of this space, which was ventilated in the usual way by an air-brick and ventilator from the street, was 350 cubic feet. The point of entry of the ventilating air was exactly opposite that at which the cables were found to have developed a fault, which, extending into a short-circuit, completely destroyed by heat a length of 6 feet of cable and bitumen filling. The total mass of bitumen destructively distilled was 22 lbs. There was no outlet for the large quantity (70 cubic feet) of inflammable vapour produced, except through the foundations; and the evidence was clear that it had passed in this way into the house, and had been observed there by its penetrating smell some time before the explosion.

The circumstances of ignition were not evident, nor was any pronouncement made on this point by the Jury. There are several possibilities for this; the simplest, perhaps, being that the unfortunate man who was attempting to remove the skirting board to get at the source of the smoke had struck a match to see where it came from. There is also the fact that the gases emerging from a trough full of semi-molten copper and red-hot carbon must have had a high temperature; and on a rapid rush of these gases coming into contact with the explosive mixture formed beneath the floor, this might have been ignited—by the exhaust, as it were, from an internal combustion engine. There is, finally, the possibility that the access was so free through the foundation that as the arc ceased after the short-circuit was cut off the mixture was drawn in and was ignited in the trough—a burst of flame through the stones communicating the explosion to the floor space. Assuming a possible pressure of 15 lbs. per square inch, or nearly a ton per square foot, the damage could be readily accounted for. The floors in the two rooms were driven apparently to the ceiling with such force that the two people standing on them were forced through, and were found on the floor above. Walls and windows were destroyed, and the houses shortly after razed for the public safety.

There was no illuminating gas supply in the houses or nearer than 33 feet across the street. The gas-mains were in perfect order; and this was dismissed as a possible cause.

The case is interesting on account of its freedom from cross issues; and it points to the necessity of making perfect seals in earthenware troughing wherever unarmoured cables are used without metallic sheathing—moisture being in this case the probable cause of the initial breakdown.

At the Queen's Hotel, Forfar, last Friday, the marriage was solemnized of Mr. Dugald Currie, the Gas Engineer to the Airdrie Corporation, and Miss Mary Fowlie, elder daughter of Mr. A. S. Thomson, B.A., Rector of Forfar Academy.

CONTINUOUS COKE CONVEYOR AND QUENCHER.

The Société de la Manutention Mécanique Industrielle, in conjunction with M. Pierre Picard, have taken out a French patent (No. 454,125 of 1913) for an appliance for conveying coke from the retorts continuously out of the retort-house, and quenching it.

The patentees acknowledge that there are in existence various devices for effecting this object, but they are considered to possess certain drawbacks which it is claimed are removed by their invention. In the accompanying illustrations, fig. 1 is a general view of the arrangement; figs. 2 and 3 being sections of two possible forms of conveyor.

An endless band of wire gauze A is laid in a trough or channel B in front of the settings. This trough may be made entirely of cast iron, or simply of stout sheet steel, with lateral cast-iron friction-plates acting as guides for the sides of the band. This runs at one end over a drum C, which sets it in motion, and at the other end over a second drum D, the shaft of which is subjected to the action of a suitable counterweight. This drum thus ensures regular and permanent tension of the band A. The returning portion of this band runs under the floor of the retort-house, and is supported in places by rollers E having guiding edges and provided with lubricators.

The position of the band in the trough may vary. The devices shown in the diagrams are designed to prevent all wear of the band, which when loaded with coke would scrape against the

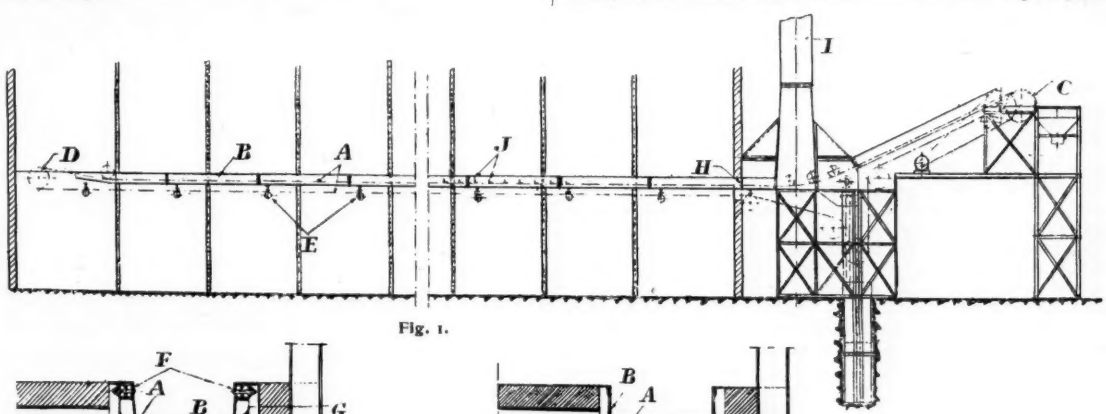


Fig. 1.

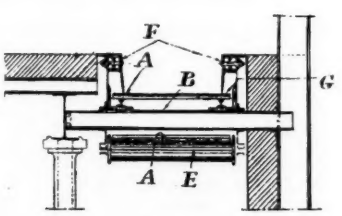


Fig. 2.

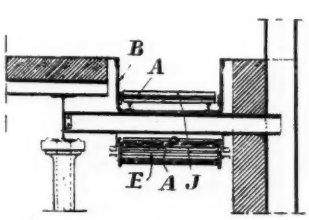


Fig. 3.

bottom of the trough. The width of the band will be approximately that of the trough. The coke can, according to circumstances, be distributed over part of the band or over its entire width. In the former case, fig. 2 shows the arrangement of the guide cheeks F with which the trough is provided to keep the coke conveyed at a certain distance from the edges of the band. This device is utilized chiefly when the bands have to rise near the end of their course. In this case, rollers for changing the direction, suitably protected from contact with the coke, can rest against the free edge G of the band without risk of crushing the coke. The device shown in fig. 3, without guide cheeks, is more especially applicable to a horizontal band, or one having a regular incline and no sudden change of direction.

The glowing coke discharged from the retorts into the trough falls on to the continually moving band, and, owing to the comparatively rapid motion of the latter, spreads over it in a thin layer. The coke is carried away without the least jolt or pressure likely to break or impair it, as far as the point H, situated preferably at the end of the retort-house, where it is quenched by a copious discharge of water above and below. The steam produced is conveyed away through the chimney I. The quenching water runs over the whole of the trough, which may have a slight incline. The level of the water is regulated so that it will cover the band for its entire length, and thus protect it from being unduly heated. Moreover, the water in the trough quenches the lower part of the coke. The conveyance of the coke may in some cases be facilitated by placing on the band, at suitable intervals, angle-irons such as are shown at J in figs. 1 and 3, the height of which would produce a series of compartments in which the coke would be distributed.

INDUSTRIAL FUEL APPLIANCES.

Some Recent Developments in the United States.

In the course of a paper on "Recent Developments in Industrial Fuel Appliances," read by Mr. E. C. WEISGERBER at the last annual meeting of the Iowa District Gas Association, the author furnished the following information in regard to the use of gas for industrial purposes in the United States.

The use of gas for industrial purposes has shown tremendous strides in the past few years, and there is nothing small or large that the industrial gas man has not been successful in handling. Some years ago, gas for industrial purposes was confined to the use of atmospheric burners; and the gas blast-furnace of the present day is one of the interesting examples of the superseding of former methods. The furnaces are designed for processes which require perfect control and even distribution of heat, and have given better and more uniform results and increased productive capacity, and have improved the quality of the product by cleanliness, convenience, and reliable operation. What is true of the gas blast-furnace is also true of gas blast-forges. These work quickly, evenly, and with little or no scale. The degree of heat required is developed in a few minutes, and they are always ready for use. Case-hardening, with the uniformity which is essential, cannot be done with coal, but can be done with gas.

A short time ago, the National Commercial Gas Association issued a booklet entitled "A Thousand Uses for Gas,"* and it would make a very long list should we rewrite it here. But as there are always new uses which are of more than ordinary interest, I will take a few moments to go over a few. One of the fields is japanning, baking, and drying in a large way, replacing the process of using steam or coal and coke. It was two gas installations at the Ford Motor Company's plant in Detroit that paved the way for the Detroit Gas Company to have large deals in the history of the gas business. The ovens were 20 feet long, 18 feet wide, and 9 ft. 6 in. high; and now there are six of them working 24 hours a day using artificial gas. The General Electric Company have thirty ovens ranging in size from 18 feet deep, 16 feet wide, and 7 ft. 6 in. to 4 ft. by 4 ft. by 4 ft., drying armatures, coils, and japanning cast and sheet metal parts, ranging from 150° to 600° Fahr. At Grand Rapids (Mich.), there are ovens 22 feet deep, 10 feet high, and 10 feet wide; and at Cedar Rapids we have one installation 30 feet long, 6 feet wide, and 7 feet high.

The industrial fuel man is japanning anything from automobile bodies down to eyelets, hairpins, and buttons. There are now made all kinds of rod-heating and metal-heating furnaces designed for special material. We have all kinds of forges; and the United States Mint is using gas only for melting and annealing, &c. Everything is now being handled, running from steel writing pens to large pieces of machinery. Tinning, &c., is now being done with gas, and with better efficiency than with other fuels. I know of one installation of the latest model of tinning furnaces which has been replaced by gas; and instead of three attendants, there is now only one, and he is turning out more and better work than three men did before the introduction of gas.

One of the most recent installations, and one of great interest, is the new process of carbonizing by gas, in which bone or other solid carbons are eliminated. Another development is the automatic heat controller and regulator, which is helping wonderfully in the industrial fuel field. Another is the new process for obtaining carbonia, or gun-metal finish, on iron or steel. In this process, no chemicals are used; it is simply a heat-treating operation with the proper oxidizing elements. The fuel in this process must be under perfect control, as a variation of temperature is likely to change the colour of the material. Gas-fired steam-boilers are

* See "JOURNAL," April 1, p. 28.

used in vulcanizing plants, in newspaper offices for matrix tables, and space-heating in engine-houses, bakeries, knitting-mills, &c. In fact, a gas-fired boiler has so many advantages that every town, no matter how small, has some prospects.

The field for water stills is unlimited; and the time will come when every office building, hotel, college, home, &c., will have its own still. There has been some wonderful improvement in atmospheric burners. I know of an installation in a newspaper office of a pot holding 18,000 lbs. of metal. Under this pot are 54 burners, and it takes 1¾ hours to bring 18,000 lbs. of stereotype metal to 620° Fahr., using 2646 cubic feet of 620 B.Th.U. gas, or 14·7 cubic feet of gas per 100 lbs. I know of another installation of a 16,000 lb. furnace having 42 burners, taking 12·8 cubic feet of gas per 100 lbs.; and still another, of 12,000 lbs. capacity, which averages 10½ cubic feet per 100 lbs. of metal. Atmospheric burners can be used very advantageously for some industrial purposes. In another installation, there are six brass-melting crucible furnaces, one of which will burn 360 cubic feet of gas per hour, and give a temperature of 2100° Fahr. inside an empty crucible in 30 minutes. This furnace melted 140 lbs. of brass in an hour.

In a candy factory, it formerly took about 2 cubic feet of gas per pound of a given kind of candy; now it takes, with the right kind of furnaces, only ⅜ cubic foot per pound. I know of one factory, in a city of 35,000 inhabitants, which has 14 gas-fired furnaces, 3 large peanut roasters, 12 batch heaters, 7 water-tables, 12 chocolate cookers, also marsh-mallow and cream boilers, all with gas, or gas-fired steam-boilers. Gas is also used to fire the sawdust and wood for smoking meats—one installation consisting of 22 smoke houses, each having a capacity of two carloads. Another notable installation in which gas is used in specially constructed furnaces, is for cooking wheat and rice, making the well-known puffed wheat and rice. One gas company, in a city of 35,000 inhabitants, has closed a deal with a concern to furnish them with 6 million cubic feet of gas per month, with prospects of increasing this to 10 millions within a year's time.

There is no city too small to have a few industrial fuel prospects. It only needs the getting and convincing of the manufacturers. There have been wonderful developments and continual improvements. At present there is scarcely a business that cannot use gas in some way.

Before closing, I should like to make a few remarks about industrial business proper. Though this field is a large one, the main thing a gas man must bear in mind is what the real needs and the prospect are, what he is doing and what he ought to do, and then the right kind of furnace to do it with. Next the right kind of installation, made under the proper conditions, to enable him to demonstrate what gas can do. It is not necessary to have a high-priced industrial fuel engineer on the ground. Some good common sense, mixed with a little mechanical knowledge, is all that is needed. Do not instal a furnace because the manufacturer says it is good, but know that it is good. Be sure you have the right thing, so that you do not fall down. One mistake will do more harm than the good of a thousand successes.

In the course of the short discussion on the paper, the author furnished some additional particulars. He said: Having once convinced a man that he can do a thing better and cheaper with gas, he is only too willing to use it. The only drawback is the initial cost of the installation. Industrial appliance concerns all over the country are only too anxious to send their products on 60 days' trial, to let you demonstrate what you can do; so that if you cannot make them keep you are nothing out except the gas used. Our Quaker Oats factory had a producer plant of about 2500 H.P., and nearly every large industrial consumer we tried to hook up said if they used gas in large quantities they would prefer to put in a producer plant. We had to show them that on one furnace we were able to give efficiency. We spent six weeks getting the right burner, and when we did find it, and showed them what we could do, they were willing to let us try on four batteries, then on 16, with the understanding that they would use artificial gas only, provided they could get service from us if they should treble their capacity. We are now figuring with one of the other oatmeal mills on a drier which uses about 3000 tons of coke a year. They want to use a table 90 feet long and 20 feet wide; and we are trying to get a burner to take the place of this coke for heating it.

PREPARATION OF SULPHATE OF AMMONIA.

The Société Lorraine de Carbonisation have taken out a patent (No. 454,246 of 1913) for France for an apparatus for the production of sulphate of ammonia. It is shown in the accompanying diagram; and the patentees claim that, though it is of limited dimensions, it will allow of the treatment of ammonia corresponding to a make of 8000 to 10,000 kilos. (8 to 10 metric tons) of sulphate per 24 hours, without incurring any loss due to the carrying forward of saline particles or the defective absorption of ammonia. Fig. 1 is a section of the apparatus; fig. 2, a section on the line X of fig. 1, as seen from below.

The ammoniacal gases enter the apparatus through the dip-pipe A, placed in the centre of the bell B, and partially immersed in the acid contained in the saturator C. The lower part of the dip-pipe is perforated, to allow the escape of the gases and the division of the gaseous bubbles. The bell in which the gases collect at their exit from the dip-pipe has the peculiarity of being perforated with holes D, which give homogeneity to the acid liquor, both within and outside it, and facilitate renewal of the liquid and gaseous surfaces in contact, with the object of effecting the complete absorption of the ammonia.

To avoid neutralization of the acid by the ammonia inside the bell, and prevent the formation of saline crusts, distributing pipes E (fig. 2), fed with acid from a tank, under pressure, are placed in suitable number—*i.e.*, three—under the cap of the bell. These pipes, the ends of which, as shown in fig. 2, are perforated, give a uniformly distributed supply of acid. It can be readily understood that, thanks to this device, which constitutes a distinctive feature of the plant, the impure vapours which might have escaped the action of the acid in the saturator are mixed by the shower of acid, and the ammonia they contain is completely transformed into sulphate.

Fig. 1.

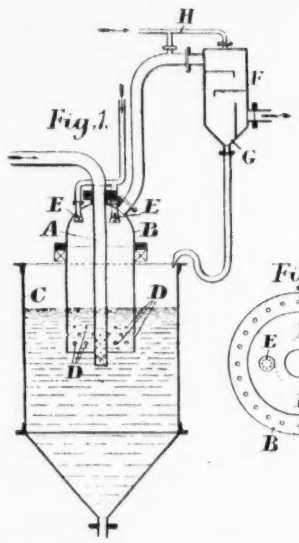
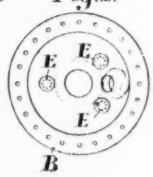


Fig. 2.



The remaining gases rise in the bell, and pass into the dryer F, in which they move downwards, and make their exit by the action of suction, produced at the lower part of the dryer, in the direction of the arrow. Baffles inside the dryer prevent the impure gases entraining saline particles. These fall into a funnel G, and return to the saturator through the syphon-pipe shown. Thus it is possible to avoid all entrainment of sulphate. Water can be injected through the pipe H on the dryer, and the pipe from the dryer to the saturator; and in this way all danger of obstruction by sulphate of ammonia crystals can be prevented.

For this simple plant, the following advantages are claimed: (1) Complete absorption to about 0·01 per cent. of the sulphate of ammonia formed. (2) Absolute retention, to about 0·01 per cent., of the sulphate. (3) Production of a sulphate which is perfectly white, and consequently of a quality well appreciated in agriculture. (4) The heat of reaction of the ammonia on the acid suffices to evaporate the water added periodically to wash the dryer, without any need to insulate the apparatus to heat. (5) The cost of the plant is considerably less than that of other systems, yet with the same productive capacity.

Important Installations of Coppée Plant.

We learn that Messrs. Newton, Chambers, and Co., Limited, of Thorncliffe, near Sheffield, have lately placed an order with the Coppée Company (Great Britain), Limited, of King's House, Kingsway, W.C., for a complete coal-washing and bye-product coking installation to be erected at Thorncliffe. The plant will consist of a Coppée washery, with crushing plant for treating 500 tons of coal per day, together with a 500-ton storage bunker for crushed and washed coal, which will be combined with the coal-stamping station. There will be a battery of 44 Coppée regenerative bye-product ovens, provided with electrically driven coal-compressing, coal-charging, and coke-discharging appliances The bye-product plant, on the direct process, includes the necessary plant for the recovery of tar, sulphate of ammonia, and benzol; and every provision is being made in the plant for an extension to 60 ovens. The contractors have undertaken to carry out all the excavations and sidings, and to complete the whole plant ready for working. The Coppée Company have also secured the order for a coal-washery of 300 tons per day to be erected at Newton, Chambers, and Co.'s Grange Colliery, near Rotherham.

The Coal Output Last Year.—The annual Home Office Report on Mines and Quarries, issued on Thursday, shows that last year there was a decrease in the output of coal in the United Kingdom general to all districts except South Wales. The total output was 260,398,578 tons—a decrease of 9,207,772 tons on that of the previous year. This is attributable to the coal strike; and the fact that the loss of output is not greater is accounted for by the circumstance that immediately prior to that event the collieries in most districts were worked very hard.

REGISTER OF PATENTS.

Valveless Gas-Engine.

SLABY, R., of Charlottenburg, Berlin.

No. 12,561; May 28, 1912. Convention date, Nov. 17, 1911.

This invention relates to a valveless internal combustion engine, in which the admission and exhaust are controlled by pistons, so that "all the special appliances for controlling the admission and exhaust, and the means for working them, are unnecessary."

The engine is of the type in which in a cylinder there are two pistons, separately driven from the crank-shaft, so that they move sometimes towards, and sometimes away from, each other. In this way, the space between the pistons is twice enlarged and twice diminished during each revolution of the crank shaft, and at the same time is changed from one end of the cylinder to the other. In other words, the working chamber may be considered as shifted longitudinally of the cylinder from the inlet to the exhaust positions. One piston carries a sleeve-like extension, in which there are ports or passages which co-operate with ports in the walls of the cylinder or with ports in the other piston; also an asymmetrical movement of the pistons is obtained by the displacement of the centre of the crank-shaft from the centre line of the cylinder, or by the displacement of the pin joining the two connecting rods from the longitudinal axis of the connecting rod operated by the crank. By this construction the advantage is said to be gained that no valves are required.

Charging and Discharging Gas-Retorts.

LAKE, W. E.; a communication from the Riter-Conley Manufacturing Company, of New Jersey, U.S.A.

No. 17,855; Aug. 1, 1912.

This apparatus for charging and discharging horizontally arranged gas-retorts is of the kind in which the scoops for charging the retorts are raised and lowered on screws by a motor to bring them opposite the retort to be charged; and the object of the invention is "to produce an electric substantially automatically operated machine, wherein the charging and discharging operations may be carried out much more efficiently than hitherto."

The invention is not further described in the specification apart from a series of seven sheets of detail drawings, consisting of nineteen figures, with hundreds of reference letters. It must suffice, therefore, to state shortly the patentees' claims. They are for:

1. A machine wherewith the retorts are charged and discharged by electrically operated scoops filled with fuel from a hopper, raised and lowered on screws, and brought into the position for charging and discharging the retorts by means of electric motors.

2. A track adapted to be raised and lowered on vertical screws by an electric motor; and a movable carriage mounted thereon, and provided with a hollow ram, adapted to be supplied with a determined quantity of coal or the like—the ram being adapted to eject the coke from a retort and simultaneously to supply the retort with a fresh charge of coal; the ram being reversed and withdrawn from the retort automatically.

3. A spring-controlled friction clutch disposed between the mechanism operating the carriage and the motor driving the mechanism; the clutch being provided also with mechanism for adjusting the pressure between the co-acting faces of the clutch.

4. A machine for charging and discharging retorts wherein the vertical screws on which the track is raised and lowered are connected by universal joints in such manner that they are operated simultaneously.

5. A device adapted to break electrical circuit at a determined moment and thereby limit the movement of the hoisting mechanism in either direction.

6. A device adapted to prevent the operation of the hoisting mechanism when the telescope gates, on to which the coal drops on its way to the scoops, are closed.

7. A machine for charging and discharging retorts, wherein the prevention of the operation of the hoisting mechanism is effected electrically by mechanism which controls the opening and closing of the telescope gates.

8. The provision of a safety switch which is adapted to prevent the travel of the machine and the operation of the hoisting mechanism when the scoops are in the retorts.

Valves for Gas-Fires.

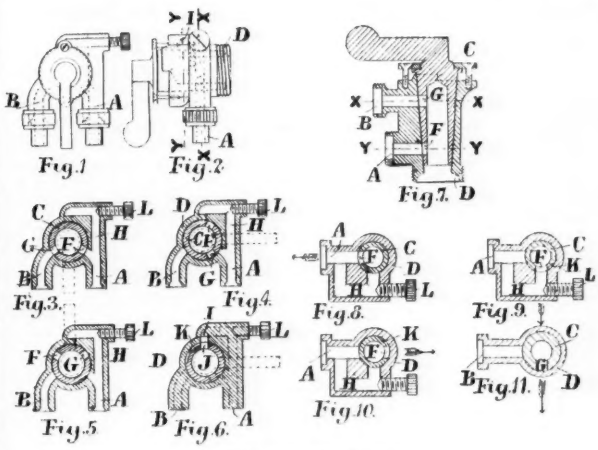
TOOTH, L. F., of the Commercial Gas Company, Stepney, E.

No. 18,524; Aug. 12, 1912.

This invention relates to valves intended primarily for gas-fires fitted with duplex burners.

In such fires, the patentee remarks, the burner jets are divided into sections, which are fed through two supply pipes controlled by a two-way valve, so that, when a low fire is desired, the supply through one of the pipes can be cut off. With the usual type of two-way valve, it is found that when the supply through one of the pipes is cut off, the pressure in the other increases—thus providing too large a flame. The present arrangement is designed to overcome this defect, and comprises a construction of valve such that when the supply through one pipe is cut off, the pressure in the other pipe (and consequently the size of the remaining flames) is not altered.

In order that his invention may be readily understood, in the following description he refers to the supply of gas through both pipes as the full supply, and that through one only of them as the half supply. The half supply is sent through an auxiliary duct connecting the half-supply pipe and the valve, and this duct is fitted with a regulating device



Tooth's Gas-Fire Valves.

whereby the flow of gas through it can be so adjusted that the size of the flame is not altered when changing from the full to half supply or *vice versa*.

Figs. 1 to 6 show a form of valve for use when the two supply pipes are disposed horizontally. Figs. 7 to 11 show a modification in which the supply pipes are disposed vertically one over the other. Fig. 1 is a plan; fig. 2 a side elevation; figs. 3 to 5, sections on the line X—X of fig. 2—showing the valve in full, half, and closed positions respectively; fig. 6, a section on the line Y—Y, showing the valve in half position.

The two sets of burners are fed through supply pipes A B, controlled by a hollow plug valve C. Gas is supplied through a pipe connected to the lower end of the valve casing D and passes to the pipes A B (when the valve is full on) through the apertures F G in the plug. The pipe A also communicates with the valve through a duct H and an upwardly directed opening I, as shown in figs. 2 and 6. The plug is also formed with an aperture J above the apertures F G, which is adapted to register with the outlet I. As the valve is turned from the full to the half position, the apertures pass out of register with the outlets, as shown in fig. 4. Meantime, the aperture J comes into register with the outlet I, so that that the half supply is sent through the duct H into the pipe A. The plug C is also formed with a milled-out portion or recess K, extending from the aperture J, so that the supply is not entirely cut off in changing from full to half, or *vice versa*. The duct H is fitted with a regulating screw L, by which the flow of gas through it can be so adjusted that there is no alteration in the size of flame in changing from full to half, or *vice versa*.

In figs. 7 to 11, the supply pipe A is vertically beneath the pipe B, and the apertures F G are correspondingly arranged. In this arrangement, it is not necessary to have a separate outlet J for the opening I, as this can be arranged on the same level as the outlet F, which establishes communication through the duct H when the plug is turned into the half position.

The patentee appends to the specification four further sheets of drawings showing other examples of valves according to his invention.

Discharging Vertical Retorts.

KOPPERS, H., of Essen-Ruhr, Germany.

No. 29,371; Dec. 20, 1912.

This invention relates to apparatus for discharging vertical retorts, working either intermittently or continuously.

In his specification, the patentee says it has been proposed to use, for assisting the discharge from a vertical retort, a substantially wedge-shaped member, fixed or rocking, arranged centrally at the bottom of the retort, so that the charge rests thereon [he uses an appliance of this kind in his invention]. In some cases the appliance has been used with vertical retorts which have an elongated horizontal cross-section, heated at the longer sides; but the ratio of the length of the cross-section to its width has not been so high as to result in the natural splitting of the coke in the retort, along a vertical seam parallel with the longer sides.

In connection with horizontal retort-ovens for producing coke and gas, it has been found that, if the working chamber is high and narrow and is only heated at the sides, the cakes of coke split at the centre. In this invention he uses a vertical gas retort so proportioned that its horizontal section is approximately similar to the transverse vertical section of a horizontal coking oven; and by this means he obtains the result that the cake of coke also has a tendency to divide or split at the centre, directly over the wedge-shaped appliance referred to. He thus utilizes the natural tendency of the coke to divide, for facilitating the splitting of the charge by the wedge-shaped appliance. In order that this tendency may occur, the length of the elongated cross section must be considerably greater than its width. The proportion of about 5 : 1 is said to be "very convenient, and certainly the proportion must exceed 2 : 1." The heating need not be confined to the longer sides, but must be mainly at those sides, or else the coke will not split regularly, parallel with same.

The construction of the chamber of a high, narrow shape, heated only at two sides, has another advantage. In the case of a chamber of the usual cross-section, heated on all sides, a layer of carbon is formed on the wall of the retort, and this layer, being continuous all round, sets so firmly that it is impossible for it to peel off by itself. In the case of a high, narrow retort, however, the large expanse of the walls, and the

fact that the front walls are not heated, prevent the formation of a continuous layer of carbon, and the graphite peels off while the retort is in operation.

Fig. 1 is a vertical cross section of a bench of retorts; fig. 2 is a section perpendicular to the plane of fig. 1 showing only the bases of the retorts. Fig. 3 shows another form of construction.

In figs. 1 and 2 the retorts, arranged in pairs side by side, have a cross section of approximately 450 by 2500 mm. They are provided with a hopper B closed by an ordinary type of closure C. The gas chambers of the retorts are connected to two mains D E. The heating of the vertical chambers is preferably effected by means of gas divided into separate horizontal streams which pass through regenerators N O. P Q are discharge flues. Pivoted underneath each retort, inside an extension F, is a segmental body G, which has a ridge or blade S and can be rocked about its pivot by a lever arm H and a rope or chain I.

Fig. 1

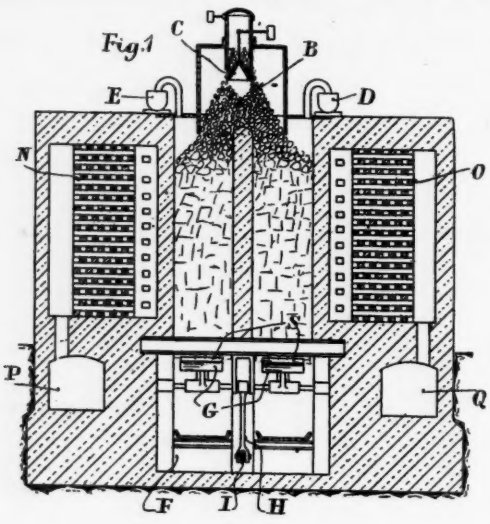


Fig. 2

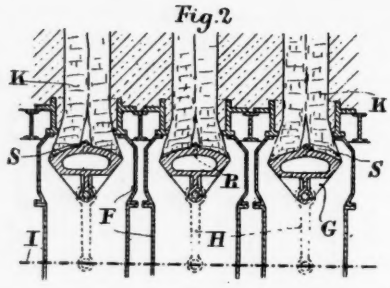
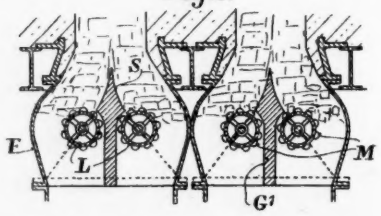


Fig. 3.



Kopper's Discharge for Vertical Retorts.

The ridge splits open the cake of coke K along its natural seam, and the surfaces of the body G deflect the two halves left and right, while at the same time supporting the main body of coke. The bodies G are hollow, and may be water cooled, the heated water escaping through holes R formed in the ridges or knives S, and thereby serving to cool the incandescent coke. The steam generated either escapes upwards with the gas into the mains D E, or is decomposed while passing through the contents of the retorts.

The modification shown in fig. 3 has "certain advantages under certain conditions." In the case of the rocking segmental bodies G, these bodies have to support the whole weight of the charge while moving. In fig. 3 the splitting body itself, designated G^1, is fixed and co-operates with two rollers L, which are mounted at either side of it, and by rotating in opposite directions, deflect the coke downwards to either side. With this arrangement the greater part of the weight of the coke column is carried by the fixed splitting member because, although the cake of coke has a tendency to split, it still offers a certain amount of resistance to the splitting operation. The rollers are thus relieved of most of the weight. Moreover, the rollers always rotate in the direction in which the coke is to be moved, so that useless friction is avoided. The retorts are flared at the bottom, where they join casings F, in which the fixed splitting bodies G^1 are arranged centrally—such splitting bodies extending along the whole base of the retorts. The rollers L, have peripheral teeth or bars M, and are rotated so as to deflect the coke away from the splitting members. The body G^1 may be hollow and water cooled, the heated water escaping through holes at the apex S for the purpose of quenching the coke.

Treatment of Gases and Recovery of Products.

COLEMAN, W. H., of Withington, Manchester.

No. 20,900; Sept. 13, 1912.

This invention relates to the treatment by ferrous sulphate of gases from coke-ovens, gas-retorts, gas-producers, and the like. "By it, ammonia, sulphur, and cyanogen can be recovered and rendered useful."

The gases are passed through and treated in a suitable scrubber or washer which preferably possesses several compartments. The washing or scrubbing is effected by a ferrous sulphate solution fed into the gas outlet end of the scrubber in the neutral condition, and pumped or caused to flow through the scrubber from compartment to compartment from the gas outlet end to the gas inlet end in such quantities and at such rate that while an excess of neutral ferrous sulphate solution is maintained at the gas outlet end, to ensure the recovery of the last traces of ammonia, the liquor at the gas inlet end is completely saturated with ammonia as a result of the addition of ammonia and sulphuretted hydrogen to the stream of gases at that end. So that the whole of the sulphuric acid of the ferrous sulphate is combined as ammonium sulphate, and the iron of the ferrous sulphate is in the form of precipitated ferrous sulphide mixed with complex iron, and iron and ammonium cyanogen compounds, formed from the cyanogen in the gas under treatment. The maintenance of the washing liquid with an excess of neutral ferrous sulphate at the gas outlet end, and the presence of excess of ammonia and sulphutetted hydrogen at the gas inlet end (which are essential to the complete recovery of the ammonia and the production of a sulphate of ammonia free from iron), have already been proposed, the patentee remarks; but, according to the present invention, the maintenance of either or both such excesses is ensured by the addition to the scrubber of liquor or gases produced or evolved in subsequent stages of the process.

The muddy liquid leaving the washer will contain, among other bodies, ammonium sulphate and ferrocyanide, ammonia and sulphuretted hydrogen in solution, and ferrous sulphide and complex insoluble cyanogen compounds as solids. It is treated directly with steam, or is otherwise heated up to a sufficient degree to render the soluble cyanogen compounds insoluble, and to drive off the excess of ammonia and sulphuretted hydrogen, which may then be led back to the stream of gases entering the scrubber. The muddy liquid left after this treatment contains, in solution, mainly ammonium sulphate free from iron compounds, and, as solids, a mixture containing ferrous sulphide and complex iron-cyanogen compounds. It is filter-pressed or similarly treated for the separation of its solid contents; and marketable ammonium sulphate is recovered from the liquid as known—as, for example, by boiling it down.

The press cakes are treated with sulphuric acid in quantity slightly less than would be required to decompose the whole of the ferrous sulphide, so that a neutral solution of ferrous sulphate is obtained, which, after any required filtration or settlement for the removal of any ferrous sulphide it may contain, and insoluble iron cyanide compounds, is returned for re-use in the scrubber, and sulphuretted hydrogen is evolved.

The sulphuretted hydrogen may be burned for the production of sulphuric acid in the known way, or it may be treated by the Claus or any other process for production of sulphur. If sulphuric acid is produced, this acid may form the greater part of the supply needed for the treatment of the filter-press cakes.

After the filter-press cakes have been treated with sulphuric acid, the resulting mud is treated with an excess of sulphuric acid to drive off any remaining sulphuretted hydrogen, which is then utilized as described. The resulting mud, which now consists chiefly of insoluble iron-cyanogen compounds, is filtered, and the filtrate is washed to remove any traces of soluble iron and ammonium compounds. It can then be worked-up into commercial cyanogen products in any known way. The acid liquor or washings can be used up in the treatment of further filter-press cakes.

Fresh ferrous sulphate will have to be added from time to time to replace that taken out as iron-cyanogen compounds. As the ferrous sulphate solution produced in the process is returned to the washer for re-use, no loss of ammonia can occur.

The gases on their way to the washer or scrubber may be kept above the dew-point in temperature, and have their tar extracted in any suitable way, or they may be cooled so as to deposit the tar and "virgin" ammoniacal liquor. In the latter case, the "virgin" liquor is distilled with the proper quantity of lime, and the gases evolved are led into the cooled gases entering the scrubber. In any case, it is remarked, the tar should be extracted as far as possible from the gases before they enter the scrubber, as its presence interferes with subsequent processes —as, for example, filter pressing.

Gas-Lamps.

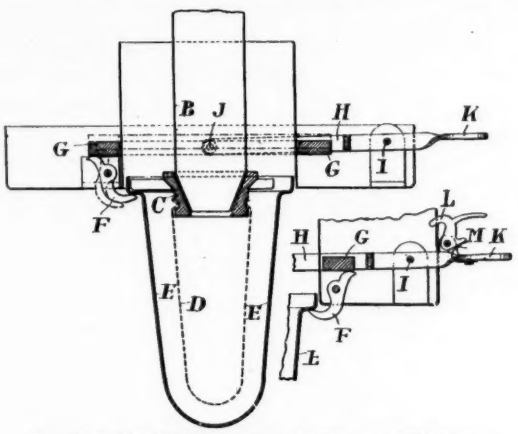
SOUTH METROPOLITAN GAS COMPANY, and CHANDLER, D., of Old Kent Road S.E.

No. 5616; March 6, 1913.

This invention has reference to inverted incandescent gas-lamps of the kind in which the mantle-ring is made to fit the nozzle of the mixing-tube of the burner; the object of the invention being so to support the mantle and its ring upon the nozzle that the mantle will readily come away when cleaning of the lamp is required, and at the same time will not be exposed to damage by wind or accidental contact during handling.

Accordingly, the lower end of the nozzle is made conical, and the mantle-ring is correspondingly formed to fit it. The mantle-ring has externally projecting radial arms, the ends of which are adapted to rest in the neck of the globe, which is supported by catches pivoted to the lamp casing and having a tendency to hang clear of engagement with an outer flange formed on the globe. The catches are pressed inwards to engage the globe by weights or springs capable of being simultane-

ously released when disengagement is desired. On the release of the globe by the catches, it can be removed—carrying with it the mantle and mantle-ring, "which rest in the globe as safely as in a box."



Chandler's (South Metropolitan Gas Company) Gas-Lamp.

In the lamp casing, the mixing-tube B is placed centrally and formed with a conical end or nozzle. C is the mantle-ring shaped to fit the nozzle and furnished with radial arms; and D is the inverted mantle attached to the ring. The globe E is adapted to receive in its neck the ends of the arms of the ring. F are catches pivoted to the casing in a position to support the globe when rocked (as shown in full lines). G is a weighted ring resting upon the upper ends of the catches, and tending to press the lower ends of the latter inwards towards the globe. To raise the ring, a forked lever H is provided, fulcrummed at I on the casing, and attached to the ring on either side by screws J. By depressing the end K of the lever, the ring is raised and the catches fall (into the dotted line position) clear of the globe. To prevent the accidental disengagement of the catches, a retaining device is provided upon the lever H, consisting of a hook L pressed into engagement with a hole in the casing by means of a light spring M.

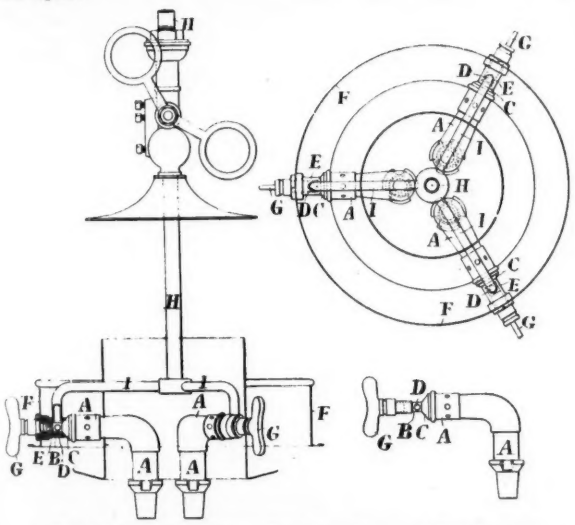
The disengagement of the hook L and the depression of the end K of the lever H is done with one hand, while the other hand receives the globe containing the mantle as it is released by the catches F.

Gas-Burners.

South Metropolitan Gas Company, and Chandler, D., of Old Kent Road, S.E.

No. 3394; Feb. 10, 1913.

In modern gas lighting, it is remarked in the specification of this invention, much of the efficiency is dependent upon the proper maintenance of the fittings—that is to say, the fittings have to be kept clean and in good order if the highest efficiency is to be maintained. It is therefore a usual practice for gas companies to undertake the maintenance of the consumer's fittings; and they are ever on the look-out for fittings which can be kept in order with the least expenditure of time and trouble. The present invention is designed to facilitate the detachment of burners for incandescent lighting for the purposes of cleaning and repair.



Chandler's (South Metropolitan Gas Company) Gas-Burner.

The illustration shows a portion of a three-burner inverted lamp with the invention fitted to it.

The burner itself (of any convenient form) comprises the usual mixing tube A with air inlet holes and gas injector at its rear end. The inlet to the gas injector is through a tubular portion B extending centrally from a conical portion C and having a lateral opening D. The tubular portion is inserted into a sleeve or box E attached to the wall F of the lamp casing, and is secured therein by a fly-nut G introduced into the sleeve E from the opposite end and screwed on to the tubular part B, which is threaded to receive it. The conical surface C at the back of the injector makes a gas-tight joint with the inner end of the sleeve. The gas is brought into the lamp by the central pipe H, and is distributed to the burners by the branch-pipes I, each of which is connected up to its respective sleeve E. By unscrewing the nut G the burner is released; and it can then be taken out. In the detail drawing the burner is shown detached; but the nut G has been replaced on the part B.

APPLICATIONS FOR LETTERS PATENT.

17,937.—White, C., "Manufacture of cyanides." Aug. 6.
18,236.—Farrell, F. J., "Preparation from coal tar, creosote, and the like of tar acids, such as phenol cresols and their homologues." Aug. 11.
18,255.—Killing, K., "Obtaining an increased yield of light from inverted incandescent bodies." Aug. 11.
18,290.—M'Gregor, J. G., "Lamps." Aug. 12.
18,301.—Board, F., "Regulating-valve for use with hot water heating apparatus." Aug. 12.
18,357.—Möller, E., "Separating suspended particles from gaseous bodies." Aug. 12.
18,362.—Potter, W. D. G., "Injectors and burners." Aug. 12.
18,406 —Wilson, W. G., "Obtaining oils and other products from carbonaceous matter or other materials containing hydrocarbons." Aug. 13.
18,413.—de Fontaine, T., "Gas-generators." [Addition to No. 24,611 of 1909] Aug. 13.
18,430.—Farbenfabriken vorm. Friedr. Bayer and Co., "Producing sulphochlorides of phenol-carboxylic acids and of their derivatives." Aug. 13.
18,454.—M'William, G. W. & A., "Rotary bunsen burner." Aug. 14.
18,467.—Clay, J. R., "Repairing damaged pipes." Aug. 14.
18,478 —Ford, R., and Thwaites, J. H., "Radiators." Aug. 14.
18,491.—Harsant, H., and Purvis, C. H., "Petrol gas generating-apparatus." Aug. 14.
18,513.—Hignett, C. R., and Robins, C. F., "Construction of lamp iron or bracket." Aug. 14.
18,531.—Leigh, P., "Joint for pipes and mains." Aug. 15.
18,555.—Sperryn, G. N., and Barrett, S. R., "Control devices for gas systems." [Addition to No. 23,039 of 1910.] Aug. 15.
18,557.—Terry, G., "Inverted incandescent gas-burners." Aug. 15.
18,584.—Clarke, J. H., "Acetylene generators." Aug. 15.
18,599.—Glover, S., and West, J., "Regenerator settings for vertical retorts." Aug. 15.
18,615.—Santa, L., "Density regulator for use in the manufacture of sulphuric acid." Aug. 15.
18,621.—Laurent, J. L., "Thermo-gasifying apparatus for liquefied gases." Aug. 15.
18,635.—H. R. Marsden, Limited, and Taylor, N., "Plant for making a tar macadam." Aug. 15.

Gloucester Gas Company's Profit-Sharing Scheme.

The Committee and members of the profit-sharing scheme in connection with the Gloucester Gas Company are to be congratulated on another successful year's working. At the annual meeting last Wednesday, the Chairman (Mr. J. H. Jones) was able to announce a bonus for the year of 7½ per cent. on the employees' wages; being ½ per cent. higher than last year, and 2½ per cent. more than when the scheme was started five years ago. Since the introduction of the scheme, the total funds held in connection with it have increased from £391 at the end of the first year to £2116 in 1912 and £2729 now, or a record increase of £613 in the past twelve months—a fact which shows that the scheme is having the desired effect of encouraging members to put by a useful little sum to meet an emergency. The Company make up the difference between the bank interest and 4 per cent. on the funds received from the members of the scheme. Another object has also been accomplished by the scheme—viz., that each man has a personal interest in preventing waste of time and material; and as gas is supplied cheaper to the consumer, so, according to the rules, the bonus given to the men is increased to the extent of ½ per cent. for every penny reduction in price. Since the inauguration of the scheme, the Company have been able to lower the price of gas by 5d. per 1000 cubic feet—the present figure standing at 1s. 10d. General satisfaction was expressed at the signal success of the scheme; the Chairman remarking that he should like to see it adopted more generally by commercial concerns. He knew of two other companies in the country who had followed their example. The report and statement of accounts were passed.

Fatality at the Burton-on-Trent Gas-Works.—Last Wednesday, a Coroner's inquest was held in respect of an accident at the Burton-on-Trent Gas-Works on the 18th inst., by which William Lucas (58) lost his life. A fellow-workman stated that with Lucas and two other men he was employed in cleaning and scraping the paintwork in the purifying-room, two sets of scaffolding being erected. The planks were 1½ inches thick, and were at least 8 feet from the floor. One of the planks broke, and witness and deceased fell to the floor. The acting yard foreman, who saw the scaffolding after it had been fixed, said he was satisfied that it was safe. He examined the broken plank after the accident, and considered it to have been in good condition. There might, he said, have been a little "over-reaching," entailing additional strain, to get at the paintwork; but he found no flaw in the plank itself. Mr. J. Ferguson Bell, the Consulting Gas Engineer to the Burton Corporation, said he would have passed the plank as perfectly sound. He had since taken a similar plank and loaded it with 9 cwt., or three times the weight of two men; and it stood the strain perfectly. A verdict of "Accidental death" was returned.

MISCELLANEOUS NEWS.

AUSTRALIAN GASLIGHT COMPANY.

Half-Yearly Report—The Effect of the Strike.

In the report for the half year ended June 30, which was presented by the Directors of the Australian Gaslight Company at the annual meeting on the 28th ult., they state that the profits for the past half year, after making provision for bad and doubtful debts, deducting interest on borrowed money, repairs and renewals, depreciation of plant, working expenses, and all other charges, amounted, with the balance brought forward, to £71,321; and they recommended the payment of a dividend for the six months at the rate of 10 per cent. per annum on the "A" and "B" shares. This would absorb £63,749, and leave a balance of £7572 to be carried to the next account. The Directors express regret at having to report that on the 28th of February last the Company's workmen, without any notice, broke the agreement then existing by going out on strike, and did not return to their duties until the 8th of March. Their action caused considerable inconvenience and loss, not only to the Company but to the general public. The resumption of work was made conditional upon a Wages Board being appointed to consider the scale of wages. The subsequent award granted to the whole of the workmen practically 1s. per day extra, the estimated cost of which will be about £30,000 per annum.* In consequence of this, the Directors intend to apply to have the standard price of gas increased, in accordance with the provisions of the Gas Act.

* See "JOURNAL" for April 29 (p. 341).

LIVERPOOL UNITED GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday—Mr. H. WADE DEACON (the Chairman) presiding.

The Directors reported that the revenue for the six months ended the 30th of June was £699,832, and the expenditure £595,676; leaving a surplus of £104,156. The amount available for distribution was £84,492; and they recommended the payment of dividends for the half year of 5 per cent. on the ordinary consolidated "A" stock and 3½ per cent. on the 7 per cent. "B" stock.

The CHAIRMAN, in moving the adoption of the report and dividends for the half year, said the year had been extremely busy. Sales, expenditure, and income had all risen. The sales increased 6·8 per cent., which was a very large expansion. He was glad to say the growth was partly due to increased consumption by the old customers, who used gas-fires and cooking-stoves, and partly to an addition of new consumers. Hence the basis of the sales was wide. The increased expenditure was mainly due to the extra cost of manufacture, arising from advances in the cost of coal and oil. This accounted for about £36,000. Repairs and renewals for the maintenance of plant also formed a heavy item. The Directors expected an increased demand for gas during the coming winter, and, therefore, had to provide apparatus to meet the demand. The cost of materials and of erection had largely increased; and this accounted for £56,000 in the charges for repairs, renewals, and additions. Another item of increase was in regard to the co-partnership scheme; the total amount being £7800. The Directors were perfectly satisfied that the scheme had produced excellent results in the working, and that the relations between the Board and the workmen, which had always been good, would be improved. The great bulk of the men were loyal, and the Directors met them constantly in committee and discussed matters; the co-partnership scheme proving a valuable addition to the arrangements of the Company. Then there was an item of increase under the heads of insurance and compensation; the National Insurance payments appearing for the first time, and bringing the amount of about £797 last year to over £1800. This increase was entirely due to the National Insurance Act. The total of their expenditure was £595,675. On the credit side, the sales of gas (£528,439) showed a very satisfactory increase of £35,915. The residuals had produced £151,427—an increase of £32,000 on coke, tar, and ammoniacal liquor. The total receipts were £699,832; while the balance (£104,156) was almost the same as last year. He ought to mention the increased expenditure on capital account (£54,984); the Directors having overspent £67,032. They, however, had a balance of stocks, which would shortly be offered for sale in the ordinary way. After deducting the amount taken for the payment of the dividend declared last February, there remained a balance of £84,492, out of which the Directors recommend a dividend absorbing £53,000; leaving £31,000 to be carried to next year's account. The price of gas had occupied the careful consideration of the Board. Although they had to face a large increase in the cost of coal and oil, and also advances in other items of expenditure, they were very loth to make any change in the price of gas; and they had decided to leave it as at present. The price next year therefore would remain at 2s. 1d. per 1000 cubic feet. On the whole, he thought he might congratulate the shareholders on a satisfactory year; and he hoped to go through the next twelve months without an increase in the price of gas. The future, however, depended largely on the state of the coal and oil market at the conclusion of the current contracts.

The DEPUTY-CHAIRMAN (Mr. J. Ernest Tinne) seconded the motion, which was carried.

The retiring Directors (Messrs. Ernest Bateson, A. H. Bright, Archibald J. Tod, and Alfred Tyrer) and the Auditor (Mr. Burton W. Eills) were re-elected, and the proceedings terminated with the usual votes of thanks.

The accounts accompanying the report of the Directors show that the total paid-up capital, including premiums, on the 30th of June was £1,650,665, out of £1,719,548 authorized; leaving £68,883 unissued. The amount raised on loan at the above-named date, including premiums, was £336,309, out of £380,000 authorized; leaving £43,691 unissued. The capital account shows that £1,986,974 has been raised, and £2,054,006 spent; showing an over-expenditure of £67,032. In the course of the year, a sum of £65,155 was laid out for new buildings, plant, &c., new mains and service-pipes, meters, cookers, and fires. But from the above-mentioned total is deducted £10,171 for depreciation of cookers, fires, and meters condemned or destroyed; bringing the amount down to £54,984. The reserve fund stood at £125,000, and the co-partnership bonus and savings at £23,930, at the close of the year. The following is the

REVENUE ACCOUNT.

Expenditure.

Year to June 30, 1912.		£ s. d.	£ s. d.
	Manufacture of gas—		
£260,144	Coals, including oil, dues, carriage, unloading, and all expenses of depositing same on works	296,335 7 6	
14,204	Purifying materials, water, and sundries	13,696 0 9	
	Salaries of Engineers and Superintendents and officers at works	8,404 16 4	
43,183	Wages and gratuities at works	46,503 9 9	
	Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials and labour, *less* old materials	73,875 4 11	
53,064			438,814 19 3
£378,608	Distribution of gas—		
	Salaries of Surveyors, Chief Inspector, Inspectors, Assistant Inspectors, &c.	13,322 1 11	
13,244	Repair, maintenance, and renewal of mains and service pipes, including materials, laying, paving, and labour	19,863 8 4	
18,343	Repairing, renewing, & refixing meters	22,917 13 1	
26,952	,, ,, ,, fires and cookers	21,710 15 2	
10,813			77,813 18 6
	Public lamps—		
1,769	Lighting and repairing	..	1,675 15 10
	Rates, taxes, and rents—		
706	Rents	699 4 6	
32,764	Rates and taxes	35,183 14 7	
			35,882 19 1
	Management—		
1,200	Directors' allowances	1,200 0 0	
8,264	Salaries of Secretary, Accountant, and clerks, office keepers, and messengers	9,032 15 2	
8,026	Collectors' commission and salaries	7,920 10 6	
2,929	Printing, stationery, and advertising	3,037 11 10	
	General establishment charges and incidentals	3,388 1 11	
3,315	Official Auditor	157 10 0	
158	Shareholders' Auditors	21 0 0	
21			24,757 9 5
	Special charges—		
22	Law and Parliamentary charges	13 16 5	
	Contributions to officials' superannuation fund	3,149 7 6	
6,456	Moiety of superannuation to old officials	3,514 19 9	
—	Co-partnership bonus	7,817 8 5	
4,962	Bad debts	351 4 11	
389	Insurances and compensations	1,883 15 4	
797			16,730 12 4
£520,078			595,675 14 5
104,883	Balance carried to net revenue account		104,156 9 5
£624,961			699,832 3 10

Income.

Year to June 30, 1912.		£ s. d.	£ s. d.
	Sale of gas—		
	Per ordinary meters at 2s. 1d. per 1000		
£358,382	cubic feet	374,637 6 3	
	Per automatic meters at 2s. 8d. per 1000		
109,716	cubic feet	129,507 4 6	
	Public lighting at 1s. 10 5d. per 1000		
24,426	cubic feet	24,295 8 3	
£492,524			528,439 19 0
13,015	Rental of meters	12,046 8 0	
	,, fires and cookers	7,817 19 7	
	Residual products—		19,864 7 7
65,304	Coke (*Less* expenses)	80,307 8 5	
21,501	Tar ,, ,,	34,288 8 8	
31,044	Ammoniacal liquor ,, ,,	34,780 12 4	
1,473	Other products ,, ,,	2,051 7 10	151,427 17 3
100	Rents		100 0 0
£624,951			699,832 3 10

The following statements relate to the working:—

Statement of Coal and Oil.

Description.	In Store June 30, 1912.	Received During Year.	Carbonized or Used During Year.	In Store June 30, 1913.
	Tons.	Tons.	Tons.	Tons.
Common	29,594	260,133	244,001	45,726
Cannel	4,789	38,243	38,846	4,186
Total	34,383	298,376	282,847	49,912
Gas oil—gallons	1,032,727	5,463,266	5,684,744	811,249

Statement of Residual Products.

Description.	In Store June 30, 1912 (Estimated).	Made during Year (Estimated).	Used in Manufacture during Year (Estimated).	Sold during Year.	In Store June 30, 1913 (Estimated).
Coke—tons	3,342	183,149	45,274	138,958	2,259
Tar—gallons	228,518	4,475,229	22,292	4,501,122	180,333
Ammoniacal liquor—gallons	410,271	8,238,177	*Nil*	8,264,897	383,551

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The Secretary (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

TREND OF THE GAS BUSINESS.

The Chairman, in moving the adoption of the report and accounts, said: I must preface the remarks I have to make to-day, by thanking you for coming here on an August morning, when, I think you will quite agree, everybody ought to be away on holiday. It is a great encouragement to us when our constituents take an interest in their property. I am afraid shareholders who get regular dividends, as we in this Company have had for many years, become satisfied to receive these dividends, and leave the Company to take care of itself. I suppose that we are all inclined to do this. However, I need not occupy much of your time to-day. Sometimes I have had to make long explanations of the Company's affairs; but to-day I think I can get through in a very few minutes. I am quite sure, if you have read the accounts, you will agree that they are eminently satisfactory, more especially when you take into account the circumstances under which we have been working during the half year. In fact, for myself, I can look back upon the past with a great deal more contentment than I can look forward to the immediate future. Though I do not regard the future with any degree of anxiety, still I think we have somewhat difficult times ahead of us to get through the next twelve months. One regret we all feel on this side of the table, and you will share it, is that circumstances have prevented the lowering of the price of gas. We have now been looking forward for some time to reducing the price. But we have been prevented; and we are very sorry for it.

STEADY PROGRESS CONTINUED.

It is satisfactory to notice that our business still grows slowly but steadily. We sold this half year 22⅔ million cubic feet of gas more than we did in the corresponding half of 1912. This is the equivalent of 1¾ per cent. But it follows on an increase of 3½ per cent.; so that is satisfactory, if slow, progress. And the growth is of a very pleasing nature because it clearly has in it the elements of permanence. As you are probably aware, like all gas companies recently, we have been losing some large lighting accounts; but, on the other hand, we have been gaining a great many small ones. These small ones, like small fish, are sweet, as we are not likely to lose them to other forms of illumination. Every year too, we sell more gas for heating, cooking, and power purposes. One of the interesting characteristics of our district (and we have some characteristics as you know which are not particularly pleasing) is that we have a very large field indeed for the supply of gas for industrial purposes. I have alluded in times past to the fact that we supply all the fuel needed for making the coinage of the realm. At Messrs. Rothschild's refinery in the Minories, we have installed a large battery of furnaces invented and patented by an active officer of the Company (Mr. Tooth); and I believe that the firm are highly satisfied with doing their smelting and refining by gas. Then we supply furnaces in an increasing number for the manufacture of confectionery, and for the melting of lead, the blending of oils, and for engines. [Sir FREDERICK GREEN: And for shipbuilding.] Sir Frederick Green reminds me, also for shipbuilding. When we come lower down the list, we supply a good deal of gas for heating tailors' irons. There is another matter for congratulation, that, though we have often had to chronicle a decrease in the sale of gas through ordinary meters, and for public lighting, in the last two half years we have had an increase in both these departments. To give you an idea of how the Company is progressing, I may say that for the half year ending December, 1912, we had an increase of 1⅓ per cent. in the sale of gas through ordinary meters, and 1 per cent. in the sale of gas for public lighting; while through prepayment meters the increase was no less than 8⅓ per cent. In the past half year we have had a small increase of 0·27 per cent., about ¼ per cent. from the ordinary meters, nearly 1 per cent. from the public lighting, and 3⅓ per cent. from the prepayment meters.

COAL, THE OUTSTANDING FEATURE.

The outstanding feature of the half year is a further increase in the cost of raw material. It is very difficult to state exactly what are the causes for the increase—the large increase—which has taken place in the price of coal. Some people say there are no legitimate causes; other people say, undue legislation; other people say, strikes; other people say, irregularity of work by the miners; and others again say, the extraordinary activity in the industries of the country. I suppose the real truth is that all these causes have, more or less, contributed to the rise in the price of coal. But the fact remains that we are paying for our coal at the present moment no less than 54 per cent. more than we were paying two years ago. When we made our contracts for the supply of coal in the spring of 1912, we had to give 2s. 7½d. per ton more, f.o.b. in the Tyne, than the previous year; and when we made our contracts for coal this year, we had to give 2s. 1½d. per ton more than that. These make an increase of 4s. 9d. in two years on the cost of coal; and this 4s. 9d. on the amount of coal we use, represents something like £47,500 a year. This year we shall have to pay for our coal no less than £21,250 more than we paid for it last year. I have to say quite openly that, had it not been for the residuals having come to our rescue with record prices, we should not have been able to make both ends meet—that is to say, we should not have earned our full dividends. Just to show you how the gas industry has been handicapped, and how we have struggled against adverse circumstances, I looked up (in a commonplace book I keep) the prices of coal since I became connected with the Company in 1887. The first four years' average price of coal was only 5s. 10¾d. per ton. The next ten years the average price went up to 7s. 3¾d.; and the average price in the ten years to 1914 (to which our contracts extend), is no less than 10s. 6d. Therefore, in some 25 years the average price has almost doubled. Yet, through all, we have not only maintained our dividend, but have kept down the price of gas—the dividend is higher, and the price is lower, than when I first knew the Company.

THE POSITION OF OIL.

There is an element in the present situation which, I think, is a little disturbing—that is the great increase in the price of oil. I do not quite know what are the causes for this; but I can at any rate give you some of them. The supply in the United States of America has fallen off to some extent; and the large sources of supply that have been opened up in Mexico are not yet available to this country, owing to the cost of shipbuilding. This has prevented the oil owners from building new steamers; consequently freights have been more scarce for the last six months, and very dear indeed.

HISTORY WILL REPEAT ITSELF.

But when we look at the prices of coal and oil, we find that the present situation is not without precedent. In 1899, we gave for our coal in the North 8s. 2d. per ton; the next year, 16s.; but the following year the price came down to 8s. 10d.; and two years after, to 7s. 10d. per ton. History repeats itself; and what has been will be. The price will no doubt come down; and there are indications that when we buy our coal next spring, we shall pay for it a less price than now. But there is no need for uneasiness so far as the Company are concerned, because our carry-forward will amount to no less than £92,866; and, in addition, we have £38,115 in the reserve fund—a total of nearly £131,000. This large sum stands between us and the necessity of increasing the price of gas, with the consequent obligation of lowering the dividend and the bonus to our employees. This sum of money is there to be used; and we shall not hesitate to use it to prevent what I regard as the calamity of having to raise the price of gas.

A MORE STABLE POSITION.

Anyone who has followed the course of the gas industry the last few years will not have failed to notice how its position generally has improved. The trade has become more stable than it was 20 or 25 years ago, because gas is now the source of light, heat, and power of the masses of the country rather than, as it was then, the luxury of the few. I think you will agree with me that electricity remains, and probably will remain for some time, a luxury. Gas has come into the category of being a necessity—at any rate, to millions of people in this country, who get on very well without electricity, and whose lives would be all the worse if deprived of gas supply. This fact has done much to increase the stability of the gas industry. Fortunes, as a rule, have been made from small profits arising from the manufacture and sale of cheap articles of universal use, rather than from large profits that come from expensive manufactures which are available for only a few rich people. I do not say for a minute that large fortunes will be made out of gas again; but I am quite sure that gas is a sound and safe investment, with a profitable future before it.

CO-PARTNERSHIP AND HEALTH INSURANCE.

I want to dwell for a moment on profit-sharing. Our profit-sharing scheme, which costs the Company a considerable sum of money every year, continues to be a great success, both in the opinion of the managers and in that of the Board. Now no less than 90 per cent. of our employees are participating in it. Their interest amounts to £58,000; and the annual bonus, which in 1902 was only £3123, in 1912 (ten years after) amounts to £7133—more than double. Then we have completed the first year of the National Health Insurance. Mr. Bradfield tells me he finds the estimates of the Government actuaries as to the amount of sickness have been largely exceeded—by no less than 33 per cent. Of course, we must not forget there is more sickness, as a rule, in the first half of the year; and we have only had six months of paying the benefits. It may be, therefore, that the figures will adjust themselves when we get a full twelvemonth's experience. It is rather interesting to notice the difference of our experience between the National Insurance scheme and the old Works' Sick Clubs which we had before. The last complete year of our experience of the Works' Sick Clubs was 1911. Then we had 357 members, and 134 received sick benefit in the year. That is equal to 38 per cent. For the first six months of this year, the National Health Insurance Approved Society had 1011 members, of whom 234, or 47 per cent., received sick benefit; so that you see the calls upon the funds of the Society have gone up by 9 per cent. I would just like to say one word of warning which perhaps may reach other ears than those at present in this room. It is this: The Company's guarantee is given on the assurance (and the Directors feel it will not be abused) that our men will look strictly after the interests of the Company in this matter. Perhaps some new members might be inclined to take advantage when they have been ill, and remain on the sick list a little longer than is necessary. I do not think there has been any malingering in our case. I have the utmost confidence in the workmen that they will do the right thing, and will see that no one takes undue advantage of the fund.

THE FINANCIAL RESULT.

Turning to the accounts, I think, as I have already said, you will find them perfectly satisfactory. The fact that we have earned our dividend, and have a fair surplus over, is in itself a good feature. But I must warn you, we have not yet felt the effect of the increased price of coal and oil, because we had large stocks, and because our residuals gave us a very good return indeed. We are now in the current half year beginning to feel the effects of the increase in the price of coal; and I am afraid, when we meet you next time, we shall not have quite such a good account to give you. First, coal and oil cost £17,698 more than in the corresponding half. This is equivalent to 2½d. on the price of gas. Residuals brought in £7994 more, which is equivalent to 1d. per 1000 cubic feet. So that our coals cost us £9700 more, which is equal to 1¼d. per 1000 cubic feet. The total expenditure, allowing for the extra return on residuals, was £3653 more; and our income was more by £3812. Gas gave us £2780 more; and rental of meters and stoves produced £1041 more. This leaves us with a profit which is almost equal to the one we had to announce this time last year—only, in fact, £168 less. The profit in the first half of last year was £73,097; in the past half year it was £72,929. The result is, we have a surplus of £8485 over dividend to carry forward to the next half year. This is

made up in the following way: The profit you will see is £72,929; the balance of debenture interest is £8148. Deducting the one from the other, leaves £64,781. Our dividend requires £56,296; and this leaves a surplus of £8485. This, with the sum brought forward (£84,381), gives us an amount with which to begin this half year of £92,866.

GOOD CONDITIONS WAIT ON THE FUTURE.

Now I have only this remark to make, that our relations with our staff, our men, our customers, and the local authorities are all good—as good as they can be; and I think I can add that our relationship with our constituents, the proprietors, is also as good as it can be. Our works were never in more efficient condition. They are thoroughly up-to-date. We never had a more zealous or able staff, nor workmen more thoroughly imbued with the fact that their welfare is bound up with the prosperity of the Company. Therefore, I think I may say that we can regard the present with satisfaction, and look forward to the future with confidence.

The DEPUTY-CHAIRMAN (Mr. Walter Hunter), in seconding the motion, said he cordially agreed, as did all the members of the Board, with the encomiums passed on the staff. A better staff they could not possibly have. There was only one point he should like to mention for a moment. It did appear to him to be an extraordinary thing that this country was parting with coal, and allowing it to go abroad—parting actually with one of the assets of the country—without making any charge upon it for the benefit of the country. He felt strongly that something ought to be done in this direction.

Mr. FRANK JONES inquired whether it was not possible for the Company to have some control over the supply of coal as well as over the conveyance of it. There was such danger in the present position. The Company had their liabilities, and they were at the mercy of the coalowners to charge what they liked.

Mr. GEORGE ENNIS said the Chairman of another important Company [Mr. H. E. Jones, see p 565] had stated that the higher price of coal in their case had prevented the Company making a reduction of 4d. per 1000 cubic feet. He (Mr. Ennis) had no doubt it was the same in the case of the Commercial Company. Anyway, he hoped the fact would go back to the working men of the country, as showing them how their expenses were influenced by the strike. He saw by Government statistics that the cost of food and other things had increased by 20 to 25 per cent. Here in the single instance of gas, the cost might have been reduced to them by 4d. per 1000 cubic feet, had it not been for the results of strikes brought about by their own political leaders. He heartily congratulated the Chairman upon (as was always the case) the interest conveyed in his address to the proprietors.

The CHAIRMAN thanked both Mr. Jones and Mr. Ennis for their remarks. He thought Mr. Jones would agree with him (the Chairman) that at the present time, when the price of coal stood at such a figure, to talk of buying collieries was a ticklish business. However, he sympathized with what the proprietor said. He himself quite felt that in past years gas companies had been asleep in the matter; and they might have made themselves better off than they had done in this respect.

The motion was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. H. E. JONES, dividends were declared at the following rates per annum: £5 9s. 4d. per cent. on the 4 per cent. stock, and £5 6s. 8d. per cent. on the 3½ per cent. stock, both less income-tax.

Mr. WILSHAW moved, and Mr. FRANK JONES seconded, a vote of thanks to the Chairman and Directors.

This was heartily carried.

The CHAIRMAN, in acknowledging the vote on behalf of himself and his colleagues, said it was a great pleasure to the Chairman and Directors to see the Company growing and prospering; and they hoped it would continue to do so for many a long year to come. He was sure the proprietors would not like this opportunity to pass without giving their cordial thanks to those who had worked so well and satisfactorily during the half year. If the Directors had felt any anxiety about the rise in the prices of coal and oil, their officers felt it much more. The Directors got away from the stress sometimes; their officers were in the thick of it all day long. But they never failed the Company; and they always did their best for it. The proprietors could not have a more zealous, efficient, and able staff than they had from Mr. Stanley Jones, their Engineer and General Manager, and Mr. Bradfield, their Secretary, downwards. As to the "rank-and-file" of the Company's employees, the Directors met them a good deal—at least three or four times a year. Certainly, one benefit of the National Insurance Act had been that it had brought the Directors more in contact with the men. Some of the Directors were members of the Committee of Management of the Company's Approved Society. They met the men at the meetings, and talked with them. The more he knew of them, the more he respected them, and the more confidence he had in them. The men he believed did their best for the Company. They were alive to its interests; and they gave their best services in return for what the Company did for them. Through the Company's Benefit Society, they really gave sixpence in benefit for threepence. What the Company did, the men highly appreciated, because it was a real benefit.

Mr. ENNIS seconded the motion, and it was heartily passed.

Mr. STANLEY H. JONES, in expressing thanks for his staff, the men, and himself, remarked that the accounts on this occasion surprised even the most sanguine of the officers. He had always hoped the result would be a good one; and it was certainly really better than he anticipated. It was still more satisfactory when it was remembered that their case, among gas companies, was, he believed, unique. Throughout the whole of their district, they were in competition with municipal electricity supply, at the lowest rates in London, and some of these rates were as low as ½d. per unit. When this was remembered, he thought that their accounts would bear comparison with most. The Chairman had referred to the happy relations between the men and the officers; and he (Mr. Jones) could cordially endorse this. He believed to a great extent this was due to Mr. Bradshaw's own influence; for he had a way with him. When he met the men at the Co-Partnership and Health Insurance meetings, he (Mr. Jones) saw how much they appreciated having the Chairman there to talk to them, and getting round among them. They had as good a lot of men in their service now as any company could desire.

Mr. BRADFIELD, on behalf of his staff and himself, also heartily thanked the proprietors for the vote. Proceeding, he said there was one point to which he should like to refer. The Chairman had alluded to the Health Insurance Society and to the sickness benefit. He (Mr. Bradfield) admitted that, when he first made the comparisons mentioned by the Chairman, they rather alarmed him, especially as he had heard that in other gas companies' societies sickness had not increased. But on second thoughts he came to the conclusion that these companies had made their comparisons with their own prior experience; and when he made comparison on that basis, he also found there had been very little increase. But where the increase was that he found was against the Government Actuaries' estimates; and comparing with these, there was an increase of 33 per cent. This was rather alarming, but he considered there would be a decrease the current half-year. What was actually the case, he would be in a position to tell the proprietors in six months' time. There was one factor, however, which they must not forget. It was that, although they were apparently losing on the sickness claims, they were making it up very much on the administrative costs; and they had much more in hand on that than they had lost on the sickness benefit. Therefore, the proprietors need not be alarmed at the Company's guarantee.

WANDSWORTH, WIMBLEDON, AND EPSOM GAS COMPANY.

First Half-Year's Working of the Amalgamated Companies.

The Half-Yearly Meeting of the Company was held last Tuesday, at the Westminster Palace Hotel, Victoria Street, S.W.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. Chas. W. Braine) read the notice calling the meeting; and the Directors' report and accounts were taken as read.

THE PRICE AND THE DIVIDEND.

The CHAIRMAN, in moving the adoption of the report and accounts, said the point of paramount interest to the proprietors was that of dividends; and therefore he would at once plunge into the part of the report that dealt with this matter. It would be remembered that the Directors gave early notice at the close of last year that they would reduce the price of gas in conformity with the provisions of the new Act of Parliament. In the Mitcham and Wimbledon area, to comply with the special terms of the Act, they had to make a reduction of 3d. per 1000 cubic feet, and in the Epsom area of 4½d. Those who designed the clause, however, did not foresee that it was going to split a penny. But it was so; and they had to conform to it. It would be understood that, under the sliding-scale, this imposed a fresh burden upon the Directors, because they would not like to reduce the price of gas without giving the proprietors their extra dividend. It would be noticed by the report that the dividend for the Mitcham stockholders was ⅜ per cent. better, and for the Epsom stockholders ½ per cent. better. This being so, the amount required for dividend was, of course, larger than it was last year; and the proprietors would be pleased to know that this had been arrived at after full amounts had been spent on the upkeep of the whole undertaking. Perhaps they would be better pleased to know what the effect of the reduction had been upon the district. The first effect was the production of a very large increase in the sale of gas. It was 8·8 per cent. in excess of the previous year. It was quite clear, therefore, that the consumers had realized that it would be worth their while to burn more gas at the lower price; and this they had done. The 3d. per 1000 cubic feet in the Mitcham and Wimbledon district meant £11,812 a year; and this area had about one-half this sum out of the amalgamation in the very first six months of its existence. The Mitcham stockholders had obtained their share in proportion, which, under the sliding scale, was only £1320. They were welcome to it. The Board knew that the way to give larger dividends was to sell cheaper gas; and this had been the method in the history of the old Wandsworth Company for half-a-century. And he hoped it would continue to be so. In the Epsom district, the figures were much smaller. The reduction there meant that nearly £2500 had been given to the consumers in the area; while only £490 was required to give the proprietors the extra sliding-scale dividend. The amalgamation had therefore already been a very large advantage to the areas in which the Company now operated. As he had already said, the accounts showed that there had been a considerable expenditure on upkeep, and that the dividend had been properly earned, combined with which there was the additional cost of coal. It must be quite clear to the proprietors that, as coal had cost the Company practically 3s. 6d. per ton more than a year ago, which was equal to 4d. per 1000 cubic feet on the gas sold, a large sum of money which the gas consumers might otherwise have had had gone into the pockets of the colliery owners and the miners. This was not the only injury that had been inflicted upon the Company by the miserable strike of sixteen months ago. The ship and barges, which were down in the capital account as having cost £10,325 (or rather this was a portion of the total), were still unable to do their duty. They were unfinished. But for the strike having made it difficult to get iron and labour, they would have been working three months ago, and earning profit on the outlay.

THE COAL STRIKE AND THE BENEFICIARIES.

These strikes appeared to be amusing things to some people; and he thought gas shareholders and consumers had been very tolerant in the matter. When the gas undertakings were exhausting every possible means of working so that no ill-effect from the strike should fall upon the consumers of gas, the coal stocks in the country were being gradually depleted, and coal was getting scarcer and dearer. When the coal owners and the miners had squared their differences, or had had them squared for them by other people, what had happened in the meantime meant that they were both going to get a big pull out of the consumers of coal. It was easy to see that—this little piece of amuse-

ment of theirs having lasted two months, and having paralyzed industries and reduced stocks—this made coal so scarce that it was bound to be much sought after, and so be carried to a higher price. Then the miner, under the sliding-scale of price and wages, got much higher wages—due solely to the fact that he had been playing about for a couple of months, and doing his best to destroy the industry of the country. These coal strikes did not mean the same thing as they did in other industries, in which the employers lost as well as the striking employee. The owners' coal got more valuable because available coal had got scarcer. Therefore the result he had described. The Company had been prevented from making a further reduction in the price of gas to the consumers to the amount of 4d. per 1000 cubic feet, which would have been possible but for the strike. Of the total number of their consumers, some four-fifths were working men. Thus it would be seen that the extra cost to them was not a trifling matter.

HOW TO AROUSE PUBLIC OPINION AND PRESSURE.

Passing to the accounts, the expenditure on capital account had been £24,467 in the half year, of which, as he had said, £10,325 was for the new ship and barges. Ships and barges were not property that was commonly held by gas companies; but they found them very profitable property. If the Company had increased their capital at the same rate that the business had advanced, which would have been only reasonable, they would have put £60,000 to capital; but they had only increased it by £24,467, which was evidence that the capital was being enlarged with considerable care and economy. Regarding the revenue account, the gas-making materials—coal, oil, coke, and water—had cost £80,300, as against £62,543; so that about £18,000 more had gone in this direction. There were people who hoped they were going to get coals cheaper. He also devoutly hoped so. But, as he said at their last meeting, it was no use having pious opinions about the matter. His own impression was that, if gas companies were to obtain coals at a permanently cheaper rate, they must in some way be associated with the proprietorship of the coals in the bowels of the earth. If they could not do this, then they had better put pressure upon the political bodies of the kingdom to stop all this foolish headstrong striking at an earlier date than was done last year, by allowing the public to taste the "sweetness" of being in darkness. This might sound a strong thing to say; but he was sure that no good would be done so long as they did not get public opinion to realize and appreciate that pressure must be put upon Members of Parliament in consequence of the hardships that were inflicted by these insensate strikes. So long as gas companies buffered-off the strikes and wasted their reserves, and spent their lives (as their Engineer and Manager did in the spring of last year) in the most painful anxiety, with the gas consumers losing their chance of cheaper gas, nothing would be done. Until the public was made to realize by personal inconvenience, as in the case of the national railway strike not long ago, how injurious and improper these things were, there would never be any real pressure put upon the powers in Parliament to bring about some alteration which would avoid and stop such disputes, and harmful and injurious quarrels.

OTHER ITEMS FROM THE ACCOUNTS.

He had mentioned that the upkeep of the undertaking had been well maintained. There had been £23,400 spent upon the manufacturing works; £16,000 upon the mains; and a very large sum, amounting to nearly 3½d. per 1000 cubic feet, on meters, stoves, automatic meters, and things of that sort. In other words, the concern had been maintained in the same excellent condition that it had always been; and yet at the end of it all they were paying this big coal bill, and an increased dividend to the Mitcham and Epsom stockholders. There was another very satisfactory feature in the revenue account. The item of profit-sharing stood at £2000. The proprietors would be glad to know that upwards of 630 of the men were now profit-sharers and proprietors in the Company to the tune, on the average, of about £7 apiece. Seeing that it was not very long since that they started this co-partnership, for the employees to have accumulated a holding of nearly £4500 was very satisfactory. One feature on the receipts side of the account had helped them very much. Not only had they had an increase of 8·8 per cent. in the sales of gas, but a large number of people were so scared by the duration of the coal strike, and the dearness of coals, that they flocked to the Company to provide them with gas-stoves. The Company had therefore been particularly busy ever since providing the stoves; and there was a considerable income from this source.

COAL AND COKE.

However, the chief buffer against the inordinate price of coal had been that coke had sold, in their case, uncommonly well in considerable quantities, with the result that residual products had returned them the large figure of £57,987. Whether this would continue as against the high price of coals, he could not say. But in the current half year, they would be feeling the full effect of the higher price of coal, so that there would be a heavier burden upon them next time; and he was afraid that coke was not going to meet this as it had done in the past. There was the danger. There was no question that the exaggerated cost of coals was not purely due to the scarcity of fuel. There were some who doubted (as one of the technical gas papers put it) whether there was always a legitimate ground to be found in competition or supply and demand for the price that gas companies had to pay for coal; and he did not mind saying that he was inclined to so believe himself. Whenever it happened—he would not say by combination, but by any operation between parties—that they were exposed to paying more for coal than it was worth as fuel, then their coke as a fuel could not sell well against it. If they had to pay more for coal than its fuel value, then they had to sell their coke at a depreciated value; and the difference that arose would affect them considerably. They had had to give up the manufacture of carburetted water gas. Oil had gone up even more in price than coal; and he thought it unlikely, in view of the increased use of oil in the Navy and in other directions, that they would get oil at the old cheap price in the future.

INTERESTING FIGURES.

There were various economies that they had been introducing into the undertaking—for instance, in connection with the bringing of coal into the works. Those proprietors who were interested in the old Mitcham and Wimbledon Company would perhaps be pleased to know that it would not be necessary to dismantle, or to do away with, the Mitcham works, so far as coal-gas making was concerned. This was a fortunate thing for the joint Company, because, if they could maintain economy by employing this plant, it would be a considerable relief to the capital account. The systems of the three undertakings were blending very easily and simply, and were coming together very well. Another point of interest was that, in the past half year, they had supplied something like 26 million cubic feet of gas for use in the manufacture of incandescent gas mantles. The manufacturers of these mantles came into the Company's district because they could get cheap gas there. Another point was that, in the Wandsworth district, the average consumption by the coin-meter consumers was about 10,000 cubic feet; in the Mitcham and Wimbledon district, the average was about 9000 cubic feet; and in the Epsom district, 7000 cubic feet. If the proprietors looked at the respective prices of gas, they would see the cause of the difference. He thought that in future the accounts might show the total amounts of gas sold in the three areas at the different prices. He could give the figures now for the past half year. In the Wandsworth district, 644¼ million cubic feet of gas were sold; in the Mitcham and Wimbledon district, 472½ million cubic feet; and in the Epsom district, 66¼ million cubic feet—the relative prices being 1s. 9d., 2s. 5d., and 2s. 10½d. per 1000 cubic feet.

FROM ENGINEER TO DIRECTOR.

There was one thing to which he would particularly like to refer. The proprietors would have noticed in the list of Directors the name of Mr. B. R. Green. The Act under which the three Companies amalgamated contained a proviso by which the Board could co-opt any officer they thought would make a good Director. In the agreement for pensioning Mr. Green (whose office as Engineer and Manager of the Mitcham and Wimbledon Company was dispensed with), it was provided that, in the event of his being co-opted as a Director, his pension should be modified to the extent of half his Director's fee; so that in this respect the Company were considerable gainers by having Mr. Green as a colleague. They had had to seek so much assistance from him, he having the affairs of the Mitcham and Wimbledon undertaking at his fingers' ends, that they had found him to be practically indispensable.

PROSPECTIVE ISSUE OF FURTHER CAPITAL.

Another point was that the Company had a large bankers' debt. They had had to spend a great deal of money. All three Companies were more or less indebted to their bankers at the time of the amalgamation. This had gone on ever since, because it had been an unpropitious time to try to get out capital. The proprietors would have noticed how all gilt-edged securities—and he called the stock of the Wandsworth Company a very gilt-edged security—had been depressed. If they put stock up to auction, it fetched a very disappointing price. The Directors had therefore come to the conclusion that, as they would be shortly issuing £50,000 of ordinary stock and £20,000 of debenture stock, and, inasmuch as this together was but a small percentage of the total holding of the proprietors, those who were already proprietors would be better pleased to have an opportunity of tendering for a share of this new issue than to have to go to the auction room to contend for the purchase of it. However, the Directors intended to make the experiment, to see how far the proprietors would show their confidence in the undertaking, and supplement the holdings that they had already. The issue would only amount to about 7 per cent. if they divided equally all round.

The DEPUTY-CHAIRMAN (Mr. R. Garraway Rice), in seconding the motion, remarked that, as the late Chairman of the Mitcham Company, he should like to say that the Directors representing the two Companies had worked together most harmoniously; and the Mitcham Directors had from their new colleagues met with every courtesy and consideration. They owed a great deal to their Chairman, who was *facile princeps* in all matters connected with gas. They saw, too, how fully the Wandsworth Board had been determined to carry out the spirit with which the amalgamation had been entered upon by appointing Mr. Green to a seat on the Board. The Mitcham Company had under the amalgamation three Directors on the Board; and now they practically had four.

Mr. GEORGE ENNIS asked whether the £16,000 expended on mains included the cost of the necessary connections between the districts. Also whether the Directors had secured a Stock Exchange quotation for the new stocks.

The CHAIRMAN replied, as to the second question, that they had. But how far it would benefit the proprietors, he was not quite sure, because, as a matter of fact, stocks held tightly like those of this Company changed hands so seldom, and occasionally changed hands under such pressure that the vendor did not always get the proper price for his holding. The result was that the Stock Exchange quotation was often far below the real value of the stock. This was not an unusual experience. With regard to the expenditure of £16,000 on mains, it did include most of the cost of connecting the distribution systems; but a little was also spent upon the account in the previous half year.

Mr. A. W. OKE suggested, with regard to the issue of new debenture stock, the desirability of issuing debenture bonds.

The CHAIRMAN answered that the Company's Act was rather final on the matter. There was also a certain class of financial minds that did not care to have redeemable debentures, as they might be repaid at a time when the holders would not quite know what to do with the money. However, Mr. Oke's suggestion should receive the consideration of the Board.

Mr. DREWETT inquired whether there was any superannuation scheme in operation for the workers.

The CHAIRMAN replied that they had a voluntary system of superannuation both for officers and men. The item for superannuation in the revenue account was chiefly for officers superannuated under the Act of Parliament which amalgamated the three Companies. Then under the profit-sharing scheme, they paid over to the men a large bonus every year—some 7 per cent. on their wages, which enabled them

to make provision for old age. Where it so happened that, through misfortune, men were unable to make provision, the matter was brought before the Board, who never allowed one of their men to go to the workhouse or to suffer privation.

The motion was unanimously carried.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends were declared for the half year at the statutory rates per cent. per annum, as follows: On the Wandsworth "A" stock £8 7s. 6d.; on the Wandsworth "B" stock, £6 17s. 6d.; on the Wandsworth "C" stock, £5 17s. 3d.; on the Wimbledon stock, £6 2s. 6d.; and on the Epsom stock, £6 12s. 6d.

The CHAIRMAN said he could not allow this opportunity to go by without referring to the exceptional services they had had during the past trying six months—he might say, twelve months—from both Mr. C. W. Braine, their Secretary, and Mr. H. O. Carr, their Engineer. The proprietors had all had their stock certificates changed for the new ones; and he took it that not a single mistake had been found. There had also been a complete reorganization of the staff and work consequent on the amalgamation of the three Companies. To the Secretary's staff, the Directors decided to make a special present in connection with their extra exertions during the year. To their Engineer, it had been an anxious and important time. The coal strike not only made things bad in respect of coal, and put their new ship and barges back, but it retarded reconstruction work, and this was going on during the heaviest strain upon the works. A fresh burden was also put upon their Engineer and his staff by their having through the price of oil to largely dismiss carburetted water-gas, and make a great deal more coal gas. The men also put forth their best efforts during the trying time to help over things. At the Mitcham works they had a promising young engineer who conducted the works in an exemplary manner, and with great economy and efficiency. They had also to thank the official who was in charge of the Epsom works. He was sure, too, the proprietors would wish to thank all their workmen. Reverting to Mr. Drewett's question, he (the Chairman) would be sorry to declare good dividends, and to think that any old servant—any man who had worked well at his side for many years—went away empty-handed to hardship and privation. So long as he had anything to do with a Company such things should not be; but he liked to see men respond to the encouragement that the Directors gave them to work.

Mr. T. A. IVES HOWELL seconded the motion; and it was heartily passed.

Both the ENGINEER and SECRETARY acknowledged the kind words of the Chairman and the vote on behalf of themselves, staffs, and men.

Mr. WALTER HUNTER then moved a vote of thanks to the Chairman and Directors, to whom he said the proprietors were deeply indebted for the careful guidance they bestowed upon their affairs.

Mr. OKE seconded the motion; and it was cordially agreed to.

The CHAIRMAN, in responding for his colleagues and himself, said he wished to re-echo the words of his deputy, and say how well the enlarged Board worked together. There was one further point he should like to mention. The Wandsworth capital, which was, per 1000 cubic feet of gas sold, almost the smallest in the South of England, and certainly in and near London, was 6s. 5d. a year ago; that of the amalgamated Company was 7s. 1½d. It was the confident hope of the Board that by Christmas next, the figure would again be down to 6s. 5d.; and they hoped to go even lower.

BRIGHTON AND HOVE GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at the London Offices, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. E. L. Burton) having read the notice convening the meeting, the report and accounts for the six months ended the 30th of June, some particulars from which were given last week (p. 519), were presented.

The CHAIRMAN, in moving the adoption of the report and accounts, said there was very little in them of an exceptional or abnormal kind. The report showed that the Company had made remarkable progress in the past half year compared with the results for the corresponding period of 1912. The sale of gas had increased by 22,083,900 cubic feet, or 3·2 per cent., and the revenue from residual products by £4195. Small advances in finance were very convenient to deal with; and they accorded very well with the Company's policy, which for the time being was essentially a conservative one. They devoted their efforts towards extinguishing capital, instead of encroaching on the £130,000 still unissued. Indeed, they had now brought their capital down to £643,294, which was most gratifying. Something like £45,000 had been spent on raw material, which was £8890 in excess of last year's amount, a part of which was due to an increase in the quantity of gas made and the higher cost of coal. The Insurance Act cost the Company no less than £246 9s. 4d.; and the benefit fund account amounted to £1454. The latter, however, was really no new thing; and the employees had, on their own initiative, assured the proprietors how much they valued the institution. With regard to the prospects of the Company, during the last six months they had had to contend with numerous difficulties, yet he believed it would be in the next six months that they would meet with the great brunt of adverse circumstances. It might happen, however, that they would get some relief in regard to coal and oil; but at present he saw little hope in this direction. To his mind, the difficulties they had overcome without harm to the Company showed them their strong position, and they had still plenty of reserve power to help them through any further adverse circumstances.

Mr. W. A. HOUNSOM congratulated the Directors on having so well adapted themselves to the stress of the markets. He said he was glad to find that all through their troublous times the Company had not been obliged to increase the price of gas, which, had it not been for the wise management of the concern, they certainly would have had to do.

The report was adopted, and the dividends recommended were declared.

The CHAIRMAN moved a vote of thanks to the Company's officers. He said Mr. Cash (the Engineer and General Manager) had, wonderfully enough, improved some of his records, and the sale results—12,463 cubic feet of gas per ton of coal—were highly satisfactory and praiseworthy in face of the difficulties abounding. Mr. Burton had, as usual, given his unremitting attention to his side of the work; and, on the whole, they were well satisfied all round.

Mr. A. F. PHILLIPS seconded the motion, and it was carried by acclamation.

Mr. CASH, in thanking the Board for their confidence, remarked that they had now to deal with the altered condition of things; and he hoped they would emerge from all their difficulties six months hence. Referring to the benefit fund, he said the men fully appreciated the innovation; and, to his mind, the effects would be far-reaching.

Mr. BURTON said this was the sixty-first half-yearly meeting with which he had been associated; but he hoped to be with the proprietors at many more of their gatherings.

On the motion of Mr. A. W. OKE, seconded by Mr. T. A STEPHENS, a hearty vote of thanks was accorded to the Directors; and its acknowledgment brought the proceedings to a close.

MAIDSTONE GAS COMPANY.

The Annual General Meeting of this Company was held on Thursday, the 14th inst.—Mr. G. MARSHAM (the Chairman) presiding.

The Directors reported a balance of £16,629 available for distribution; and they recommended the declaration of a dividend at the rate of £3 12s. 9d. per cent. for the half year ended June 30; making, with the interim dividend, £7 5s. 6d. per cent. for the year.

The CHAIRMAN, in moving the adoption of the report, said the result of the year's trading had been most satisfactory. The sales of gas showed the very gratifying increase of 10⅛ million cubic feet compared with the preceding year. The trade of the town had been good, and this was obviously in the Company's favour. Two large factories had recently been built, and fitted with high-pressure gas, which new and effective lighting need not fear comparison with any other kind of illuminant either in brilliance or in price. It was thought desirable to adopt this system, and new mains were laid in High Street last year. These having proved a success, the system was now being extended. Gas-engines for power remained very popular; and the gas sold during the year for engines alone showed a satisfactory increase quite apart from anything else. The number of gas-cookers hired had increased from 6119 to 7283. The Company had become subscribers to the British Commercial Gas Association, which undertook the work of properly advertising the various uses of gas. The sale of residual products showed a good increase, which was some set-off against the higher cost of coal—the yield over last year being £1092 for coke, £139 for tar, and £389 for ammoniacal liquor. The relations between employer and employed were entirely satisfactory; and only last month 22 of the men took advantage of favourable terms offered them to become shareholders or to increase their holding in the Company. The Engineer (Mr. Frank Livesey) reported that the works and mains had been kept in good order and condition. After calling attention to the forthcoming National Gas Exhibition, the Chairman acknowledged the efficiency of the staff, the tact and business capacity of Mr. Gulland (the Accountant), and the energy and keenness of Mr. Livesey.

Dr. HOAR seconded the motion.

Mr. BADHAM called attention to the quantity of gas unaccounted for last year—viz., 26 million cubic feet—and asked what, in the ordinary way, would be considered a dangerous deficit under this head. He gave figures for the past four years to show that the amount varied considerably.

Mr. LIVESEY admitted that the percentage of gas unaccounted for was a rather high one, being about 7·7 per cent.; but he pointed out that the loss through leakages always varied in an unaccountable way with every gas company in the country. Out of a list of fifty companies in the United Kingdom, three-fourths had a leakage percentage higher than the Maidstone Company, whose loss on the 80 miles of mains owned by them worked out at about 350,000 cubic feet per mile per annum. This was a very satisfactory figure.

The CHAIRMAN said the matter would continue to be under the observation of the Directors.

The report was adopted, and the dividend recommended agreed to.

WEYMOUTH CONSUMERS' GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Thursday—Mr. J. G. ROWE (the Chairman) presiding.

The SECRETARY (Mr. E. Y. Wood) having read the notice convening the meeting, the report of the Directors was presented. It was stated therein that the six months ended the 30th of June had been satisfactory as regards the sale of gas; the increase in the quantity sent out over the corresponding period of 1912 being 1,128,000 cubic feet, or 1·78 per cent. The accounts showed a sum of £5268 available for distribution; and the Directors recommended the payment of a dividend for the half year at the maximum rate of 5 per cent. per annum, less income-tax.

The CHAIRMAN, in moving the adoption of the report and accounts, said that the latter showed encouraging signs, and, though there were some decreases in the items of receipts, in the main source of income there was an increase. It was extremely satisfactory to find again an advance in the quantity of gas sent out, the excess being 1¾ per cent., yielding a cash increase of £169. Meter and stove rental was £10 ahead; but residual products, the markets for which had not been quite so buoyant as the Directors would have liked, had brought in £307 less. Setting the increases against the decreases, the result was a loss on the total income of £138, which was not an amount of a very disturbing character. On the expenditure side of the revenue account,

coal was the item which gave the Directors the greatest amount of concern. This had cost £533 more, notwithstanding that 277 tons less were used. It would, therefore, occur to the stockholders that the price per ton was considerably higher; and if anyone was curious enough to work out the figures, he would find the advance was 2s. 6d. per ton. There had been fluctuations in other items of expenditure—some up and others down; the net result being an aggregate expenditure of £10 more than last year. It was gratifying to find that, under the circumstances prevailing, the Directors were able to keep the price of gas at the low figure, for that part of the country, of 3s. per 1000 cubic feet, and to obtain enough profit to pay the maximum dividend. As he had already said, the demand for gas was maintained, doubtless due to its great popularity for cooking and heating. For lighting purposes, too, gas could still hold its high position.

Mr. R. OAKLEY seconded the motion, and, after a few remarks by shareholders, it was carried unanimously.

A vote of thanks having been accorded to the Chairman and Directors for their able conduct of the affairs of the Company,

The CHAIRMAN proposed a similar compliment to the Engineer and Manager (Mr. D. F. Colson), the Secretary, and other officials of the Company, for the satisfactory way in which they had carried out their duties.

Mr. C. H. BROWN seconded the motion, and it was carried unanimously.

SALISBURY GAS COMPANY.

The Annual General Meeting of this Company was held last Wednesday—Mr. G. FULLFORD (the Chairman) presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, and the payment of the usual dividends, said the work of the Company during the past year had been of a highly satisfactory character, as the shareholders would see by the report which had been forwarded to them. The business was sound and progressive. The sales of gas for all purposes—illuminating, cooking, heating, motive power, and technical applications—had not only been fully maintained, but showed a notable increase. Residual products were also very satisfactory, and had realized fair prices. The whole of the extensive manufacturing, purifying, and distributing plant and apparatus had been maintained in good order and repair, important additions and improvements were added in detail as necessity arose, and the works were provided with every modern improvement for producing pure and high-quality gas. The Directors were convinced that the maintenance system, under the control of experienced, reliable men, tended to the best interests both of consumers and suppliers. The advances in prices of coal were a serious matter, the increase during the past year being followed by a further rise this year. But they hoped to continue to supply gas of high candle power and purity as in the past, at the present low price, as cheap gas meant increased consumption. All interested in gas were looking forward to the National Gas Exhibition to be held at Shepherd's Bush, London, on the premises known as the White City, during the month of October. Never before had a similar venture received such influential support from members of both Houses of Parliament, leading engineering scientists, and visitors from foreign countries and the overseas Dominions. The Directors and shareholders were indebted for the successful work during the past year to their valued Engineer and Manager, Mr. Norton H. Humphrys, and to the secretarial, clerical, and technical staff. No company could be better or more loyally served than they were by the large number of employees, many of whom, he was glad to notice, had been on the books for many years.

Mr. S. R. ATKINS seconded the motion, and in doing so alluded at length to the increasing importance of the residual products. The prices received for coke, tar, and sulphate of ammonia might, he said, be taken as an indication that the Company supplied a good article, and that users did not fail to appreciate it.

The motion having been carried unanimously, the retiring Directors and Auditor were re-elected.

A vote of thanks having been accorded to the Chairman, Directors, and officers for their services during the past year, Mr. H. B. WELLS responded for the Directors, and Mr. HUMPHRYS on behalf of himself and the staff.

Lea Bridge District Gas Company.—At the half-yearly general meeting of this Company last Tuesday, the Directors reported that the increased quantity of gas sold in the six months ended the 30th of June, compared with the corresponding period of 1912, was 17,013,200 cubic feet, or equal to 8·58 per cent. The revenue was £43,274, and the expenditure £34,718; leaving a balance of £8556 to go to the profit and loss account. The amount available for distribution was £12,712; and dividends at the rates of 5 and 6½ per cent. per annum on the preference and consolidated ordinary stocks (both less income-tax) were declared. A sum of £942 was placed to the reserve fund; and there was a balance of £5524 to be carried forward. The sale of gas to ordinary consumers was 209,607,000 cubic feet; for public lighting, 5,556,500 cubic feet. Mr. Arthur F. Phillips, M.Inst.C.E., has been elected to fill the vacancy on the Board caused by the death of Mr. Ulick J. Burke.

Lighting and Ventilation of Offices.—In his report for last year, the Medical Officer of Health for the City of London expresses regret at the failure of the Railway Offices Bill to reach the third reading. It provided that every office must be efficiently ventilated and adequately lighted, and must not be overcrowded while work was being carried on, so as to be dangerous or injurious to the health of the persons employed there. The Medical Officer says the requirements of the Bill are a step in the right direction; but it is difficult to understand why they should be restricted to railway offices only. Could they be extended to all offices where clerks and other persons are employed, their utility would, he says, soon become apparent in the general improvement in the health of a large and important section of the community, many of whom are at present earning their daily bread in surroundings of a most unsatisfactory and even dangerous character.

WIDNES GAS-WORKS EXTENSIONS.

Adoption of a Horizontal Retort Scheme.

In the "JOURNAL" last week (p. 518) it was briefly recorded that an inquiry had been held in regard to an application made to the Local Government Board by the Widnes Corporation for authority to borrow £36,000 for the extension of the gas-works. The inquiry was conducted by Mr. A. W. BRIGHTMORE, M.Inst.C.E.; and in view of its importance, it calls for more extended notice than that which has already been given to it.

Mr. T. CRAIK, the Deputy Town Clerk, explained that the contemplated improvements at the gas-works were based upon two reports made to the Council by the Engineer (Mr. Isaac Carr, M.Inst.C.E.), one in January, 1912, and the other in March of the present year. The objects were to still further reduce the selling price of the gas, and also to increase the output. The Council had powers, under various Acts, to borrow on the gas undertaking amounts up to £98,000; and they had borrowed £98,185. They had repaid £39,670; leaving outstanding a sum of £58,515. The Engineer estimated that the gas-works to-day, reckoned on their production, were worth a million sterling. In addition to the borrowing powers he had mentioned, the Corporation had additional powers to borrow, on the security of the works, with the approval of the Local Government Board, to the extent of such a sum as might be necessary for the purposes of the undertaking.

Mr. ISAAC CARR gave evidence in support of the application. He said he had occupied his present position for thirty-one years. During this period, the annual sales of gas had increased from 62 to 453 million cubic feet (last year); while the make for the present year, estimated on 4½ months' working, was at the rate of 520 millions, or more than eight times that of thirty-one years ago. [Witness put in a tabulated statement, showing in detail the annual makes of gas, the maximum daily makes and consumptions, the selling prices, the gross and net capital, and the number of consumers, during the period named.] He contended that the selling prices were the lowest in the kingdom; while the capital figures were also about the lowest of any municipal gas undertaking. It would be seen from the statement that, while the selling prices in 1883 were from 2s. 9d. to 3s. 6d. per 1000 cubic feet, at present they were 11d. (to consumers of 3 million cubic feet or more per annum) and 1s. 1d. (to ordinary consumers). Slot-meters were in use, and the price to consumers having them was 1s. 6½d. per 1000; but this charge, after deducting for internal pipes, fittings, and the cost of collection, was really a little below that charged to ordinary consumers. The total number of consumers in 1881 was 700; whereas last year it was 7830. The Inspector would observe from the statement that, though the consumption of gas had increased by eight times, the gross capital had increased only two-and-a-half times—from £58,540 to £139,926. Witness then went on to deal with the need for getting the new works completed quickly. He explained that the capacity of the present plant, which was to be dismantled, was about 2 million cubic feet per day. The plant comprised 203 horizontal retorts (or 406 mouthpieces), operated by manual labour. The capacity of the new plant was about 3 million cubic feet per day, and it was being laid down so as to lend itself easily to an increased output of a million cubic feet. The scheme comprised 128 extra-large horizontal retorts (or 256 mouthpieces), electrically-driven stoking machinery, telpher plant, and coal elevating and conveying plant. Coal storage was provided for 9000 tons, or a 36 days' supply with the plant working at the maximum rate of daily production—*i.e.*, 250 tons of coal, or 3 million cubic feet of gas. The work of erection was now in progress, as the exceptional rate of increase in the consumption of gas brought the department face to face with the immediate provision of additional works, or the alternative of running the town short of gas. The present plant would be utterly inadequate, because the increase in consumption was so much in excess of what they had hitherto experienced, notwithstanding the introduction of electric light and power, which were supplied at a comparatively low rate. Witness went on to explain the advantages of the type of plant which is being installed. They might, he said, have kept the old plant still in use, and provided additional works, which would have cost less than half the sum now being spent; but, having regard to the strides made in the process of carbonizing coal, he recommended his Committee to adopt a scheme whereby the whole of the existing plant was superseded. The estimated saving to be effected by the new plant, based on the results of other works, would not be less than £8000 per annum on the present output of gas; so that, apart from the question of providing additional works to meet the growing demand, the proposal merited adoption on grounds of economy alone. Though the cost of production had, for a number of years, been less than in any other town, it would be still further reduced. The selling prices of 9d., 11d., and 1s. 1d. per 1000 cubic feet—which for lighting was 20 per cent. and for power 25 per cent. less than the prices charged by any other works—would also be capable of further reduction. Almost every householder was a consumer, so that the financial benefits accruing from the proposal would be shared by practically every ratepayer. Witness then proceeded to deal with the reasons why horizontal retorts had been preferred to vertical ones. The only real advantage to be gained from the latter was, he said, a saving in ground space; and though this was very important in some undertakings, it was fortunately not so in Widnes, as the Corporation had plenty of land at their disposal. With the increased value of the residual products, owing to the new process, he believed that the 4¾d. which represented the present cost price per 1000 cubic feet of gas would be still further reduced, if not wiped out altogether, considering the £8000 extra profit it was estimated would be made.

Mr. CRAIK explained that, owing to difficulties with foundations and other things, the estimate of £27,000 had been exceeded, and it might be necessary to ask for a further loan or an amended estimate.

The INSPECTOR said it would be better to have an amended estimate. So far the extra amount was covered by the present application. If

they found a further amount necessary, a supplementary resolution of the Council would be required.

The Inspector afterwards visited the works in company with Mr. Carr and the Deputy Town Clerk.

Mr. Carr's Report on the Extensions.

In view of the interest attaching to the decision come to by Mr. Carr to recommend to his Committee the adoption of horizontal retorts in connection with the extensions at his works, we give below the report he made to them in March last, with the tabulated estimates accompanying it.

The writer has had under careful observation the developments in carbonizing plant during the last few years, and especially so during the last twelve months, having in view the additional works now necessary for Widnes.

The old method of hand stoking as at present obtains at Widnes is being rapidly superseded by improved methods of various kinds, all of which give a greater yield of gas from the coal, thereby requiring less coal to be bought, leaving a greater quantity of surplus coke available for sale, together with some saving in labour.

The systems that are being adopted by gas authorities in this country, in America, and on the Continent are improved horizontal retorts operated by stoking machinery, vertical retorts in very considerable form and variety, together with various forms of coke-oven plant. The makers of the various types of plant all claim to have special advantages. The special point in regard to vertical retorts seems to be that the plant occupies a minimum amount of ground space in proportion to the quantity of gas produced; while the coke-oven firms put great stress upon the superior quality of the coke produced by their method, and the consequent better market price.

In the matter of the quantity of gas produced per ton of coal carbonized, surplus coke for sale, maintenance and labour costs, the three systems are practically on all-fours, excepting in respect of the illuminating power and calorific value of the gas; and in this respect the advantage is decidedly in favour of the horizontal retort system and stoking machinery.

As a result of inspections of the various new types of plant in operation at other works, together with much correspondence with manufacturers and users, the writer has prepared a tabulated statement which sets forth the estimated capital outlay of the different systems referred to, together with cost of working, maintenance charges, and working results; and upon these figures he recommends the adoption of horizontal retorts, with electrically-driven stoking machinery and coal and coke handling plant, as being most suitable, on the grounds of the first capital outlay being the lowest, and the working results, costs, and maintenance charges being comparable with those of any other system.

The form of horizontal retorts recommended is one of unusual size, designed by the writer to take an exceptionally heavy charge of coal; and so, in fact, the retort becomes what may be described as a miniature coke-oven. The ordinary retorts as now used are ⏢-shape, 22 in. by 16 in. by 20 ft., and are capable of carbonizing a charge of between 5 and 6 cwt. of coal in six hours The proposed retort, which is to be built up in segments, is to be ⏢-shape, 24 in. by 20 in. by 20 ft., and will carbonize a charge of about a ton of coal in twelve hours.

Thus the new retort, though charged only twice in 24 hours, as compared with four times in the old retorts, will carbonize double the quantity of coal per retort, and produce at least 15 per cent. more gas, of equal quality, from the same coal; and while the coke will not be equal to that produced from coke-ovens, it will be very much superior to the coke now being made at Widnes by the existing method, and very greatly superior to that obtained from some of the vertical retort systems.

ESTIMATES FOR NEW CARBONIZING PLANT.

Horizontal Retorts.—Sixteen settings in three benches. *Vertical Retorts.*—Ten settings, 40 retorts in all, each carbonizing 5 tons per diem. *Horizontal Coke-Ovens.*—Twenty-five chamber ovens, each carbonizing 8½ tons per diem. *Inclined Coke-Ovens or Munich Chambers.*—Ten settings of three chambers each.

—	Horizontal Retorts.	Vertical Retorts.	Horizontal Coke-Ovens.	Inclined Coke-Ovens.
Capacity per diem . . . . . .cubic feet	3,000,000	2,500,000	2,500,000	2,750,000
Coal per diem . . . . . tons	256	200	212½	230
Prices tendered—				
Steel-framed retort-house and coal-store . . .	£3,575			
Settings complete, with ironwork	15,500			
Charging-machine	1,885	£29,783	£45,335	£42,275
Duplicate generating plant	1,575			
Coal-handling plant	2,650			
Waggon-tipper.	425	425	425	425
Coke telpher	3,450	3,450	3,450	3,450
	£29,060			
Deductions*	1,650			
Total.	£27,410	£33,658	£49,210	£46,150
Price per ton of coal carbonized	£107·06	£168·20	£231 60	£200·60
Do. per 1000 cubic feet of gas made	9·13	13·46	19·68	16·78
Dimensions.				
Retort-house	209 ft. 10 in. × 58 ft.	96 ft. × 68 ft.	..	144 ft. × 62 ft.
Coal-store	209 ft. 10 in. × 40 ft.	Not provided for	..	..
Capacity of coal-hoppers	48 hours	24 hours	48 hours	24 hours
Labour cost	7d. per ton	6d. to 8d. per ton	6d. to 7d. per ton	..
Maintenance of plant	2d. ,,	3½d ,,	3½d. ,,	..

* Coal-store roof, shortening of stanchions, brickwork over arches, and second-hand fire-bricks; also reducing from ten to eight retorts per bed.

OSSETT GAS-WORKS EXTENSIONS.

Dessau Vertical Retorts to be Installed.

As briefly notified in the "JOURNAL" last week (p. 520), the Ossett Town Council have decided to put up an installation of Dessau vertical retorts. The proposal was submitted to the Council at their last monthly meeting, at which the Gas Engineer and Manager (Mr. A. E. Mottram) was present.

The MAYOR (Mr. H. Robinson), in moving the adoption of the minutes of the Gas Committee, of which he is the Chairman, said it was his duty to make a public statement with regard to the extensions of the gas-works. The capital expenditure suggested was, with small exceptions, the only capital that had been spent on the works since they came into the hands of the Corporation. They had spent nearly £25,000 since 1901, and, with certain reservations, practically all this had been laid out in the country upon mains and services. With the growing consumption of the last few years, it must have been patent that sooner or later a large sum would have to be expended in increasing the capacity of the retort-house and purifiers. This time had come, and they had faced the situation none too soon. In one sense, he regretted the necessity; but it only indicated and measured the success of the undertaking. There was a maximum output for all machinery, beyond which it was not safe to go. At the end of next March, they would have got beyond the safe point. The existing retort-house was little in excess of the present consumption; and any increase after this year would have to be followed by enlarged plant. In 1901, when they took over the works, they made 84 million cubic feet of gas, and sold 70 millions to 3453 customers. At that time the works were at their full capacity, and the Corporation spent £5000 on the retort-house, which increased the annual capacity to 160 millions. Last year they had a make of 141 millions, a sale of 131 millions, and 8347 customers. The increase this year, so far, was upwards of 6 millions; and if this continued, they would be working up to the maximum before next March. In view of this, the Committee realized that something would have to be done. They were at present faced with this problem: Should they extend the present retort-house—which would have been a difficult thing to do—at a comparatively small cost, and perpetuate a most expensive, wasteful, and out-of-date system of carbonization, or should they launch out, spend some £20,000, and reduce their carbonizing costs by 75 per cent.? A Sub-Committee visited many works, and inspected different systems; and they came unanimously to the conclusion that the vertical system of retorts was the best, judging from the working costs. They found these retorts were costing 9d. per ton of coal, in some cases less; inclined retorts, 1s. 6d.; horizontals, 1s. 6d. with machinery; and horizontals hand-charged, 2s. 9d. to 3s. Their own cost 2s. 9d.; and they were satisfied that they could save 2s. per ton by adopting the vertical system. They were also guaranteed 2500 cubic feet more gas per ton than they now obtained, with better results in coke, tar, and liquor; also freedom from naphthalene. These results had been verified by the operations of gas-works which the Sub-Committee visited. The relative merits of four different kinds of vertical retorts were examined, and the Dessau system was unanimously adopted. By this system they got more gas from the coal, the unit of working plant was more suitable to the conditions, the residual results were as good as, if not better than, the others, and the coke was hard and bright; while the working cost was somewhat less than in any other. They had accepted a tender for £18,074, and, together with new purifiers, washer, railway siding, boundary wall, tar and liquor wells, weighing machinery, &c., they were proposing to spend £26,000. The retort-house would be built in the field, belonging to the Corporation, just below the present gas-works; and the railway siding would bring the coal straight into the retort-house. The coal would be elevated by means of machinery

to the top of the retorts; and the coke would drop out of the bottom on to a conveyor and be elevated into overhead hoppers under which carts and trucks could pass to load. With the present plant, they would next year by carbonizing 14,000 tons of coal, which would cost £8400. The cost of carbonizing would be £1864; making a total of £10,264. They would receive for coke £4410, tar £1592, and liquor £1859—a total of £7861. This, deducted from the £10,264, left £2403 as the cost of the coal, &c. With vertical retorts, to produce the same quantity of gas, they would require 11,300 tons of coal, costing £6780, and carbonizing would come to £423; making a total of £7203. They would receive for coke £3559, tar £1284, liquor £1528—a total of £6367, which left a difference of £836. This gave a balance in favour of verticals of £1567. They would also save £466 a year by the railway siding and purifiers; and as they had charged themselves with the capital outlay on plant to make the 17 millions more gas they would sell next year compared with last year, there would be a profit on this sale of £920; giving a total of £2953. The £26,000 which would be spent would cost in annual charges £1500 to £1600, depending on the term allowed for repayment of the loan; so that there would be a considerable saving by adopting the vertical system. They were asking for borrowing powers for £40,000. By the Gas Act of twelve years ago, they obtained power to raise £25,000 for the extension of the works, and for mains, services, and meters. This had been practically exhausted, and further borrowing powers were necessary, and they were asking for £14,000 more than would be used at the moment. Of this sum, £10,000 would probably be laid out during the next ten years on mains, services, and meters, and the remaining £4000 they might have to spend on new boilers, exhausters, station meter, and things of this character. At a later stage, the Mayor gave details of the proposed expenditure in excess of the £18,000 tender. He said that most of the items were estimated. The railway siding would cost about £1000; drainage, £100; boundary wall, £1000; concrete floor, £500; weighbridges, £500; purifiers, £2500 (now being constructed); and contingencies, £1000.

In view of the particulars to be found elsewhere of the estimates for the retort-house extensions at the Widnes Gas-Works, it may be of interest to give the tender submitted by Messrs. Leech, Goodall, and Co., of Leeds, and accepted, for the installation of Dessau vertical retorts at Ossett.

Four beds of eighteen 13 ft. 3 in. retorts, complete with steel-frame retort-house, coal-handling plant, hydraulic hoist, with power plant, brick-lined steel chimney, anti-dips, and retort-house governor . .	£14,626
Complete coke plant, including hot-coke conveyor in front of bench, coal-breaker, screen, retaining walls, driving gear, engine and house	1,220
Hydraulic waggon tipper for end-door waggons, together with foundations	120
Engine-house for hydraulic pumps and coal plant . .	230
Necessary rails in yard for the coke-waggons	73
Complete foundation for the plant, and the filling-in of retort house up to the level arranged	1,450
Making the coal-store floor and fitting-in the wall between the retort-house and coal-store	355
Total	£18,074

MIDDLETON CORPORATION GAS DEPARTMENT.

The Past Year's Working.

The Gas Engineer and Manager of the Middleton Corporation (Mr. W. H. A. Chester, Assoc.M.Inst.C.E.) has presented his first annual report and statement of accounts, embracing the twelve months to March 31 last. The following particulars are extracted from them.

The expenditure on revenue account during the year was £17,236, while the income was £26,552; the result being a gross profit of £9316, and a net profit of £2491. The total quantity of gas made during the year was 144,239,000 cubic feet; being an increase of 1,617,000 cubic feet over the year 1911-12, or equal to 1·13 per cent. During the year, 12,382 tons of coal were carbonized—an increase of 53 tons; and the make of gas per ton reached 11,649 cubic feet, which Mr. Chester says is a record in the history of the gas undertaking. He gives a diagram showing the make of gas per ton of coal carbonized each year for the last seven years—the difference in the figures between 1907 and the present year represents a saving of 1874 tons of coal in twelve months. For coal and cannel there was last year an expenditure of £8576, compared with £8015 in 1911-12; the mixture having cost 13s. 10·2d. per ton, or 10·2d. more than before. The total quantity of gas delivered was 134,533,200 cubic feet; being an increase of 1,464,900 cubic feet, or 1·1 per cent. on the figures for the preceding year.

There are at present 6884 meters in use, against 6958 last year; the reduction of 74 being due to the continuance of the policy of "one consumer one meter," as far as possible. Of the meters in service, 3955 are prepayment, or 57·4 per cent. of the total, against 3851, or 55·3 per cent., before. The average consumption per prepayment meter was 10,382 cubic feet, compared with 10,362 cubic feet for the year 1911-12. There are 2929 ordinary meters in use, or 42·6 per cent. of the total number, against 3107, or 44·7 per cent., for last year. The average consumption per ordinary meter was 31,913 cubic feet, compared with 29,984 cubic feet.

The quantity of gas used per ton of coal carbonized was 10,865 cubic feet, which constitutes another record in the history of the undertaking. A diagram shows the amount of gas used per ton of coal carbonized each year for the past seven years. The difference between the figures for 1907 and those for 1913 represents a saving of upwards of 2000 tons of coal in twelve months.

The unaccounted-for gas was 9,779,800 cubic feet, or 6·79 per cent.; the average for the past seven years being 6·83 per cent. Mr. Chester points out that the unaccounted-for gas is a fictitious figure, owing to the fact that the meter-taking cannot be regulated to an exact date.

Coke produced an increased revenue of £277; the amount available for sale being 7686 tons, or 12·41 cwt. for each ton of coal carbonized. Tar shows an increase of £272; the price averaging 30s. 2d. per ton, against 25s. 2d. for last year. Ammoniacal liquor and sulphate of ammonia produced an increased revenue of £91, due to a slight rise in price and in the quantity made. The amount of sulphate per ton of coal was 20·44 lbs., against 20 lbs.

In the course of some general remarks, Mr. Chester says that during the year great difficulty was experienced in obtaining adequate supplies of coal; consequently a large quantity had to be taken out of stock. Increased storage will be necessary in future to accommodate larger stocks. The price of coal advanced continually during the year, and prices will be increased again on last year's contracts. Mr. Chester remarks that the question of the cost of coal is a very serious one, and points out that the profits for next year will be greatly affected by the abnormally high price. Unfortunately, no recompense can be anticipated from increased values of residuals, for the prices of coke, sulphate of ammonia, tar, and other products have already taken a decided downward turn. The Committee are reminded that during the next two or three years a large amount will be required for renewals and extensions on the works. As the capital charges now amount to more than 1s. per 1000 cubic feet of gas used, Mr. Chester thinks it would not be a wise policy to add the cost of these extensions to capital account, but, if possible, pay for them out of the reserve fund, which still requires strengthening. During the past winter, a successful gas exhibition was held for the sale of gas-fires, geysers, radiators, &c., many of which were sold on the hire-purchase system, which is working well, and should prove of benefit to the consumers and to the Gas Department.

In conclusion, Mr. Chester says that considering the heavy increase in the cost of all raw material and the decrease in the price of gas, the past year's working will compare favourably with that of any which the undertaking has had.

KENDAL GAS AND WATER UNDERTAKING.

The Gas and Water Engineer of the Kendal Corporation (Mr. W. R. Wilson) has presented to the Committee his report on the working of the department in the year ended the 31st of March last. It furnishes the following particulars.

Dealing first with the gas undertaking, Mr. Wilson states that the gross profit for the year amounted to £3651; being at the rate of 8s. 4·82d. per ton of coal carbonized and 9·86d. per 1000 cubic feet of gas sold. Setting aside £2833 for interest and sinking fund charges, there was a surplus of £818. Out of this surplus the Committee voted £450 in relief of the rates. The reserve fund remains at £5000; and the sinking fund, including debt repaid, now stands at £16,409. The quantity of coal and cannel carbonized was 8692 tons 12 cwt.; being an increase of 141 tons 18 cwt., or 1·66 per cent., on the preceding year. The total cost of the coal delivered upon the works was £7277 15s. 10d., or 16s. 8·8d. per ton. The gas made was 94,054,500 cubic feet, being an increase of 1,606,000 cubic feet, or 1·74 per cent. The quantity sent out, as per the consumers' meters, was 88,876,000 cubic feet, being 3,280,900 cubic feet, or 3·83 per cent., more. There are at present 1947 ordinary and 2041 prepayment consumers on the books; showing a net increase of 238. During the year 76 houses were fitted up on the hire system. The number of cookers supplied to March 31 was 1455—an addition of 147. The receipts for coke show an increase of £270; for tar, of £122; but for sulphate of ammonia there was a decrease of £89. The purchase of the Staveley Gas-Works has been completed, and the area of supply extended.

In the water department, the gross profit amounted to £2470. Interest on debentures absorbed £1507, and the sinking fund £853; leaving a surplus of £110. The sinking fund, including debt repaid, stands at £12,885.

PRICE OF GAS AT MARYPORT.

A Ten per Cent. Reduction.

At the Meeting of the Maryport Urban District Council on Monday last week, the Chairman of the Gas Committee (Mr. Hardy) moved that the price of gas to all consumers should be reduced by 4d. per 1000 cubic feet; the reduction to take place on Sept. 29. He said there were one or two matters which called for the Council's serious consideration. First of all, there was the increase in wages at the gas-works; secondly, there was the higher price of coal; and, lastly, there was the fall in the market price of tar. To their advantage, they had erected a retort of a new kind which, so far, had proved very satisfactory; and when they had installed two others, there would be a substantial increase in the quantity of gas produced per ton of coal. They were also able to use a much cheaper class of coal, effecting a saving of 6d. per ton; and this in twelve months would amount to £100. Then the quantity of coke they would have for sale would be greatly increased, as it would not be necessary to use so much for heating purposes as the old beds of retorts required. There would be £200 more revenue from coke than they had had before. The number of customers had greatly increased; while gas-cookers had accounted for a large additional consumption of gas. It was interesting to note that, compared with last year, while the night consumption of gas in July and August remained almost the same, the day consumption increased by nearly 80 per cent. The cost of reducing the price of gas by 4d. per 1000 cubic feet would be £586, while the increased profits from coke, coal, &c., would amount to £700; leaving a balance of £114 to be carried forward. He thought it would be pleasing to the Council to think that, at the time when almost everything was advancing, they were able to reduce the price of gas. This was, he thought, an advantage derived from the gas-works being in the hands of the Council. Mr. Dixon seconded the motion. Mr. Carruthers moved, as an amendment, that the price to quarterly consumers should be reduced by 4d. per 1000 cubic feet, and that the reduction to the penny-in-the-slot consumers should be 5d. The amendment was, however, defeated, and the motion carried with only two dissentients.

LARGE INSTALLATIONS OF COKING PLANT.

The ceremony of drawing the first coke from the new ovens in connection with the bye-product plant at the Glamorgan Collieries was recently performed by Mrs. D. A. Thomas; among those present being Mr. Octavius Thomas, the Gas Engineer and Manager of the Rhondda Urban District Council, and Mr. C. R. Altenheim, the representing partner of Messrs. Koppers, the constructors of the plant. This comprises 100 coke-ovens of the latest type, and bye-product plant; and it has been erected at an approximate cost of £60,000. It will deal with 400 tons of coal per 24 hours, which will produce 375 tons of coke and 4 million feet of gas. The bye-products to be dealt with for the time being will be sulphate of ammonia and tar, the monthly production of which will be 100 and 180 tons respectively. Provision is also made for adding benzol plant at a later stage; while there is ample room for the erection of 50 additional ovens. Of the 4 million cubic feet of gas made daily, 2 millions will be used in connection with the industry, while the remainder will be available for heating boilers, conversion into electricity, or lighting. It was mentioned in the "JOURNAL" last week (p. 513) that it has been offered to the Rhondda Urban District Council for lighting purposes. The illuminating and calorific powers of the gas have not been stated; but it appears that they are very low. According to an interview Mr. Thomas had with the representative of a local paper, he said it was not proposed to go farther than the distillation of tar, as the coal is not a "fat" one—containing only about 20 per cent. of volatile matter.

According to an article in the Engineering Supplement to "The Times" last Wednesday, the Middlesbrough Corporation have decided to take a supply of coke-oven gas from Messrs. B. Samuelson and Co., Limited, of that town. To meet the demand, Messrs. Samuelson have placed an order with the Otto Coke-Oven Company, of Leeds, for a battery of 46 regenerative ovens with complete bye-product recovery plant working on the Otto "direct" system. They have already in operation 200 Otto waste-heat ovens, from which a certain amount of gas will be available in case of emergency; so that there is no likelihood of the continuity of the supply not being maintained. With the regenerative type of oven, such as is being installed at Middlesbrough, approximately 5500 cubic feet of gas per ton of coal are available for outside use—the remainder being required for heating the ovens; and as the gas consumption of Middlesbrough is about 600 million cubic feet per annum, the plant will have to carbonize about 110,000 tons of coal yearly. The quality of the gas, it is understood, can be readily maintained at the required standard of 14 to 16 candle power, and a calorific value of 500 to 600 B.Th.U. per cubic foot.

From the above-named source we obtain the following information in regard to the largest coke-oven plant in the world—that of the United States Steel Corporation, operated by the Indiana Steel Company, at Gary, Illinois. It consists of eight batteries of 70 ovens each, of the Koppers regenerative type; and it is intended eventually to double the installation. The coal carbonized is brought from mines in West Virginia and Pennsylvania. The charge for each oven is 12 to 13 tons, and the carbonizing period only 16½ hours. As the coal used yields 82 per cent. of coke, the daily coal consumption is more than 10,000 tons, and the coke production nearly 8500 tons. At the same time, 125 million cubic feet of gas are made daily, about 65 millions being available for purposes other than the heating of ovens. Approximately 36,400 gallons of tar and 80 tons of sulphate of ammonia are produced every day. The gases from the ovens pass to the bye-product plant through divided water-sealed 48-inch mains, designed to separate the lean from the rich gas. Ten saturator and reheater units are installed for the direct recovery of the ammonia in the form of sulphate. Ample storage room is provided for tar, sulphuric acid, and sulphate of ammonia. The clean gas, after it leaves the bye-product plant, is compressed to about 3 lbs. per square inch by two 450 H.P. motor-driven compressors and one unit driven by a Corliss engine.

Referring to the action of the Middlesbrough Corporation mentioned above, the "North Star" last Friday made the following remarks:

It appears to be unquestionable that the arrangement will be to the advantage of the general gas consumer. Gas even now in Middlesbrough is not expensive. The rate of 2s. 2d. per 1000 cubic feet is not only reasonable, but compares more than favourably with the rate levied in other large towns and cities in this country. Yet it is anticipated that a still lower rate will result when the scheme is in full working order. The factors which have influenced the Lighting Committee and their Chairman (Councillor Joseph Calvert) are important. Coal supplies are being heavily drawn upon in all parts of the country, and the minds of manufacturers and engineers are being exercised anent the resultant tendency of the supplies to increase steadily in price. Obviously dearer coal means dearer gas. The advantage of using coke-oven gas has been well demonstrated on the Continent; and at Essen the system has been found to answer admirably. It is believed, however, that Middlesbrough is setting the lead so far as this country is concerned; and naturally the scheme in working order will arouse the keen attention of all progressive municipalities. The gas will be conveyed direct into the Middlesbrough Gas-Works, and there treated for purification purposes, &c., before being distributed through the existing services.

Early in April last, the Lighting Committee entered into a contract to modernize and extend the carburetted water-gas plant at the gas-works. This will increase the capacity of the plant to 2 million cubic feet per day. It was then emphasized by Councillor Stanley Sadler, a member of the Committee, that, with the possibility of another coal strike always hanging over their heads, it was absolutely necessary for them to have a second string to their bow, and the expenditure suggested would bring the plant right up to date. Moreover, this would render them absolutely immune from being plunged into darkness if there happened, by any chance, to be a stoppage of the supply of coke-oven gas, which they would be relying upon in the spring of 1914. It will thus be seen that the Committee, with the hearty approval of the Town Council as a whole, have embarked upon a striking new departure, but at the same time are very well prepared for contingencies. The rapid strides made with the scientific treatment of products which, a decade or so ago, were regarded as of little commercial value, is really responsible for the scheme, which establishes a new link between one of the large firms on Tees-side and the Municipality in which it is established. It is a happy augury, and of equal financial advantage to both.

CROYDON GAS COMPANY AND CO-PARTNERSHIP.

Annual Report of the Committee.

The Co-Partnership Committee of the Croydon Gas Company, of which the Chairman of the Company (Mr. Charles Hussey, J.P.) is the Chairman, have presented their report, with an abstract of the accounts, for the year ended the 30th of June. It shows that up to this date, from the inception of the scheme, 709 co-partnership agreements have been entered into, and 139 have terminated; leaving 570 in force. During the year £2611 was invested by co-partners in the stock of the Company; making a total to date of £6396. A table in the report shows the growth of the scheme in its four-and-a-half years' existence. The following are the totals (omitting shillings and pence): Bonus, £10,030; savings, £4601; interest credited to co-partners' accounts, £407; invested in the Company's stocks, £6396; held by trustees for co-partners, £6106; total holdings of co-partners, £12,502. Reference is made to the starting of the "Croydon Co-Partner," and its issue as a quarterly publication, under the honorary editorship of Mr. Henry Topley, who is congratulated by the Committee on the success of the first three issues. Reference is, of course, made to the retirement of Mr. James W. Helps, who consequently ceases to be a member of the Committee; and they express great regret, in which they are sure all co-partners will share, at the cessation of his co-operation with them. The Committee are pleased to be able to congratulate the co-partners on the facts that the savings to date (four-and-a-half years) amount to 46 per cent. of the total credited as bonus, and that, apart from withdrawals arising from co-partners leaving the Company's service, only £1858 has been withdrawn out of a total of £7573 available. They feel, however, that more use might be made of the facilities afforded by the scheme for saving in the form of regular deductions from wages or salaries. These savings were, at the date of the report [Aug. 11], being effected at the following annual rates: From wages, by 32 co-partners out of 514 so paid, or 6 per cent., in amounts ranging from 11s. to 3d. per week, £214 10s.; from salaries, by 20 co-partners out of 86 so paid, or 23 per cent., in amounts from £2 10s. to 5s. per month, £207 12s.—total by 52 out of 600 co-partners, or 9 per cent., £422 2s. The Committee direct attention to the fact that the number saving by deductions from wages is low in proportion to those saving from salaries. While the Committee are aware that in many cases there may be good reasons for this, they hope that no co-partner who is in a position to take advantage of the facilities offered will overlook them.

The accounts accompanying the report, which are signed by Mr. William W. Topley, the Secretary to the Company, who is the Secretary to the Committee and also one of the Trustees, show that the combined investment and withdrawal accounts from Jan. 1, 1909, to June 30, 1913, stand as follows: Bonus, £10,030; savings, £4602; interest, £407—total, £15,039. Withdrawn, £2537; invested, £6396; held by trustees for co-partners, £6106—total, £15,039.

GAS-FIRES AND INCREASED SUNSHINE.

During his year of office, the ex-Mayor of Holborn (Mr. Walter Hazell, J.P.) expressed a desire that further steps should be taken for the abatement of smoke nuisances; and he thereupon consulted the Medical Officer of Health for the Borough (Dr. W. Arthur Bond) on the matter.

Dr. Bond prepared a report, in the course of which he said that until about twenty years ago the smoke nuisance in London had been increasing, so that the amount of winter sunshine had been diminishing, and fogs had been more frequent and denser. During the past twenty years, however, there has fortunately been much improvement. In the five years from 1885 to 1890, the mean number of hours of sunshine in the winter months was only 57; while in the five years 1905 to 1910 it averaged 103 hours—an increase of more than 80 per cent. In the five years from 1885 to 1890, the days of fog in the winter months averaged 31; in the last five years, they averaged 17—a reduction of over 45 per cent.

Dr. Bond says a great improvement has not only been effected in the abatement of the smoke nuisance in connection with factories and business premises, but much less smoke is also produced in residential buildings, which is chiefly due to the increasing use of gas and electricity and solid smokeless fuel, such as anthracite, coke, &c., for heating and cooking. For instance, the gas-stoves, fires, and other heating and cooking appliances supplied by the principal London Gas Companies now exceed 1,300,000, and must contribute in no small measure to the cleansing of the atmosphere.

Dr. Bond mentioned that the Council might set a good example in smoke abatement by having gas-fires in the Mayor's Parlour and the Public Health Department. The Public Health Committee agreed that the matter was one which should be brought to the notice of the ratepayers; and the Council sanctioned the distribution of a pamphlet issued by the Coal Smoke Abatement Society entitled "More Sunshine for London," accompanied by a letter from the Mayor emphasizing the importance of the matter, and urging the desirability of cultivating a public spirit in reducing the amount of coal smoke, and so improving the condition of the whole of the people of London. About 10,500 of these pamphlets were sent out.

Reduced Price for Power Gas at Leigh.—The Leigh Town Council have resolved to reduce the price of gas for power purposes from 3s. 1d. to 2s. 3d. per 1000 cubic feet.

BELFAST CORPORATION WATER UNDERTAKING.

Increase in Meter-Rates—Cost of the New Mourne Scheme.

The Belfast City and District Water Commissioners recently had under consideration a report recommending that the scale of charges for the supply of water by meter should be increased by 1d per 1000 gallons as from 1st of November next. Consumers using 100,000 gallons and less per quarter are to be charged 11d. per 1000 gallons; those using larger quantities being charged proportionately cheaper rates—a service of a million gallons per quarter being chargeable at 6½d. per 1000 gallons. It was also recommended that these prices, with an addition of 50 per cent, should apply to the cases of supplies by meter to consumers outside the district of supply where the charges had not been fixed by special agreement.

Mr. J. COURTNEY, the Chairman of the Finance Committee, in moving the adoption of the report, said the Commissioners would remember that the Mourne extension supply scheme, so far as it had been carried out, had very largely exceeded the estimate of cost, and that the expenditure occurred at a time when there was a slump in the erection of buildings in the city and in the sales of water for manufacturing purposes, which had a disastrous effect on the Board's income. To this were to be added the large payments falling due on account of the sinking funds; the combined effect being that the present domestic rate of 1s. 4d. in the pound was insufficient to meet the expenditure, and there would be a deficiency of £3418, which was to be taken from the reserve. Increases in wages had led to a further liability of £500. It appeared to the Committee that it would be unwise to deplete the reserve fund to any large extent. Since the Mourne scheme commenced, the water-rate on dwelling-houses had been raised from 10d. to 1s., and subsequently to 16d. The charges for water sold by meter, however, had not been altered, but remained as in 1890—the prices varying from 5½d. to 10d. per 1000 gallons. The total sales last year reached 1091 million gallons, and produced £25,537, which gave an average price of a little less than 6½d. per 1000 gallons. The Committee thought dwelling-house occupiers had borne their full share of extra taxation, and that the sum required to meet the deficit should be met by increased charges for meter supplies. The proposed increase would produce £4500 if the sales remained as at present, and this would wipe out the deficit, and leave a balance on the right side.

Mr. WILSON seconded the motion.

Mr. HOLLYWOOD cited the charges for water in Birmingham, Bradford, Brighton, Bristol, London, and Oldham, and pointed out that a good many towns had a flat-rate of 9d., while others had one of 1s. The proposed increase in Belfast would be equal to a flat-rate of slightly less than 7½d.; so that the rate would still be moderate—indeed, it would be below that of the majority of the manufacturing towns on the other side of St. George's Channel.

The report was adopted.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Banff.—On Saturday, ex-Provost Munro (Chairman) presided at the first annual meeting of the Banff Gas Company. A net profit, for the year's work, of £488 7s. 8d., on gross earnings of £3027 12s. 1d., is shown by the report. The Directors proposed to pay a dividend of 5 per cent., amounting to £255, to place £172 to the reserve fund, and carry forward the balance of £61 7s. 8d. The report was approved; and the retiring Directors (ex-Provost Munro and Mr. Peter Lyon) were re-elected, while Mr. George Shearer was again appointed Auditor.

Doune.—The Doune Lighting Company have had submitted to them by the Liquidator, Mr. James A. M'Lean, solicitor, an account showing the manner in which the winding-up had been carried out, and the final disposal of the property. At a meeting held on Thursday, it was shown that there was a divisible balance of £1488, and that this would allow of a dividend of 14s. 10¾d. per 10s. share. It will be remembered that the undertaking formerly administered by this Company was recently acquired by the Doune Town Council.

Dunoon.—The Town Council have decided to increase the price of gas from 3s. 6½d. to 3s. 11½d., although it is hoped that when the new extensions are completed a saving will be experienced which will compensate for the higher price of materials.

Greenock.—The Electricity Department have again made a net profit of £5000 on the year's working; and for the last four years the sum of £20,000 has been obtained. This is credited to modern plant, saving in labour, and the efforts of the Engineer and staff. The Port Glasgow extension does not at present produce a revenue; but a good return is expected in the future from the money expended.

Helensburgh.—The agreement of the Town Council to reduce the price of gas by 5d. per 1000 cubic feet, making it 2s. 6d., to grant special discounts to consumers of 150,000 cubic feet and upwards per annum, and to place £2000 to a depreciation and renewal fund, is an excellent testimonial to the value of the vertical retort and the saving that can be made by its use even in works of the moderate size which the Town Council and Mr. W. Blair have to administer. The wisdom of installing these retorts is abundantly proved; and Mr. Blair is to be congratulated on his foresight and pluck in being the first to erect such settings on a working scale in Scotland. That the Town Council recognize Mr. Blair's share in this good work is proved by raising his salary to £320 per annum.

Irvine.—The Gas Company are increasing the price of gas from 2s. 11d. to 3s. 0½d. per 1000 cubic feet.

Kirkcaldy.—The Gas Committee have raised the price of gas by 2d. per 1000 cubic feet, and the re-adjustment of the prepayment meters makes the pennyworth last a ten minutes shorter period when a single burner is in use.

Lanarkshire.—The long-continued dry weather is showing up the weak points in the supply of water throughout the country, and where small bodies, such as villages and townships, who have their own petty scheme of supply, are finding themselves unable to meet the demand, the larger undertakings which are under the control of the County Council are generally in a very different position. This is brought about by satisfactory engineering and careful administration, and also by the fact that a combined scheme is more able to use the best area in the district, while a local one is handicapped by the cost of piping, &c., and cannot take advantage of any but a local catchment area. The low rate of interest at which the County Council can borrow money for these schemes also assists—2½ per cent. being often all they have to pay for money obtained for such purposes.

The Lanark County Council Middle District Committee are proposing to give their constituents the same benefits as regards gas matters, and are having an inquiry made by Mr. Henry O'Connor into the value of a number of gas companies' properties and as to their suitability for acquisition for a combined supply by the county. The inquiry covers a large project, and is the more important as being the first move on the part of a County Council to combine gas supply.

Monifieth.—The Town Council are reducing their gas by 2½d. per 1000 cubic feet, and the rent charged for cookers by one-fourth.

Perth.—An increase of 3d. per 1000 cubic feet is anticipated by the consumers in Perth; and a meeting of the Town Council has been called to consider and fix the price of both gas and electricity.

Prestonpans.—The Gas Company, who have carried on the works since the commencement, having found it necessary to obtain further capital, have preferred to sell the works, which have not provided a very large dividend in the past; and they have now been taken over by a syndicate under the administration of a gas manager in the immediate neighbourhood. No doubt the old Company had a further reason for selling, in that they were not a limited liability company, but worked under a deed of co-partnery. Rumours are afloat that an extensive scheme of coke-ovens is to be shortly inaugurated at some of the collieries, and that the surplus gas is likely to be sold in Prestonpans and other places in the neighbourhood.

Stirling.—The ubiquitous Mr. George Balfour has offered to electrify the Stirling tramways, which are probably the last to retain horse traction, on condition that he acquires from the Corporation the existing electricity undertaking, for which he would pay a sum in cash, reduce the charge for lighting, and guarantee an electricity supply on favourable terms for a number of years. The proposal is before a Committee, who have co-opted one or two leading merchants of the burgh who are outside the Town Council.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia.

LIVERPOOL, *Aug.* 23.

In the early part of the week the tone of the market became somewhat quieter, and values were inclined to give way slightly; but towards the close the position has regained its former strength, and full prices were paid for all available supplies. To-day's quotations are £13 3s. 9d. to £13 5s. per ton f.o.b. Hull, £13 5s. to £13 6s. 3d. per ton f.o.b. Liverpool, and £13 6s. 3d. to £13 7s. 6d. per ton f.o.b. Leith. Consumers have been showing more interest in future deliveries, and it is reported that first-hand transactions have taken place at £13 10s. per ton for October-December, and at £13 12s. 6d. per ton for January-March f.o.b. at the principal ports in equal monthly quantities.

Nitrate of Soda.

This market continues very firm, but spot values have not advanced beyond 10s. 7½d. per cwt. for ordinary and 10s. 10½d. for refined quality.

LONDON, *Aug.* 25.

Tar Products.

Tar products have been steady during the past week; and in the principal articles there is a much better demand. The pitch market has a decidedly firmer tone. There is now more disposition among the buyers on the Continent to pay the current figures for their early requirements. In London, distillers have very little to sell, and the price is nominally 44s. to 45s. per ton. On the East Coast, business has been done at 45s. at some of the more favourable ports. On the West Coast, manufacturers are very firm indeed in their idea of value; and 44s. 6d. is reported to have been refused on the Clyde. In South Wales, there is some demand; but at present the consumers will not pay the prices asked by makers. Creosote is very steady. In London, business has been done at 3⅜d. for delivery over the next twelve months; while in the Midlands 3d. has been refused. In the North, 2⅜d., and in one instance 2⅝d., was declined. Benzol is steady for home use; but for export, it is quiet, as Continental buyers are still willing to resell at about the equivalent of the English quotations. Solvent naphtha is dull, and business has been done at low figures for delivery over the next twelve months. Heavy naphtha is also very dull. Carbolic acid is quiet; and makers cannot get the prices which they are asking. Naphthalene is unchanged. In regard to crude creosote salts, there is a very fair demand considering the time of year.

The average values during the week were: Tar, 29s. 3d. to 33s. 3d. Pitch, London, 44s. to 45s.; east coast, 44s. 6d. to 45s.; west coast, Manchester, 43s. to 43s. 6d.; Liverpool, 44s. to 44s. 6d.; Clyde, 44s. 6d. to 45s. Benzol, 90 per cent., naked, London, 1s. 1d. to 1s. 1½d.; North, 11d. to 11½d.; 50-90 per cent., naked, London, 1s. to 1s. 0½d.; North, 11d. to 11¼d. Toluol, naked, London, 10¾d. to 11d.; North, 11½d. to 11⅝d. Crude naphtha, in bulk, London, 5¼d. to 5½d.; North, 5d. to 5¼d. Solvent naphtha, naked, London, 10¼d. to 10⅜d.; North, 9⅜d. to 9⅝d. f.o.b. Heavy naphtha, naked, London, 10d. to 10½d. f.o.b.; North, 9d. to 9¼d. f.o.b. Creosote, in bulk, London, 3⅜d. to 3½d.; North, 2⅝d. to 3d. Heavy oils, in bulk, London, 3½d. to 3⅝d. Carbolic acid, casks included, 60 per cent., prompt, east coast, 1s. 3d. to 1s. 4d.; west coast, 1s. 2½d. to 1s. 3½d. Naphthalene, £4 10s. to

£9 10s.; salts, 50s. to 55s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market remains steady, though there is very little fresh business doing. Consumers abroad will not pay the increased prices which are being asked at the present moment; and the majority of business is being done principally by dealers. There seems to be a difference in the idea of value at various ports. Outside London makes are quoted at £12 8s. 9d.; Hull, £13; Liverpool, £13 1s. 3d. to £13 1s. 6d.; Leith, £13 2s. 6d.; while for the forward position, a premium of 5s. per ton is asked.

Manchester District Tar Prices.

It is officially announced that the average price realized for June deliveries of tar in the Manchester district—based on the value of the products—was 34s. 3d. per ton.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade of the north-east is brisker, and fuel is relatively scarcer; the demand being especially strong for the rest of this month and for September. Prices are thus firm for most kinds of coal. In steam coal, best Northumbrians are from 15s. 3d. to 15s. 4½d. per ton f.o.b.; second-class steams are 13s. to 13s. 3d.; and steam smalls from 8s. 6d. to 9s. 6d. At some of the collieries the men are making only moderate working time. Gas coal is thus only in limited output; and this stiffens the price for early delivery. Best Durham gas coal is quoted from 15s. to 15s. 1½d. per ton f.o.b.; second-class gas coal about 13s. 9d. to 14s.; and "Wear specials" from 15s. 6d. For forward sales, prices are easier. A contract for some 35,000 tons of second-class gas coal has been reported at 12s. to 12s. 3d. per ton f.o.b., over next year. Some of the foreign markets supplied with Durham gas coal are also weaker—23s. 6d. being now quoted for best gas coal delivered at Genoa, with a lower price for delivery a few months forward. The strong demand, however, is checking the downward tendency in prices; and the consumption of gas coals grows. Coke is firm; but some of the inland gas-works have full stocks just now. Gas coke is from 16s. 9d. to 17s. 6d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

During the past week there has been a strong market for all classes of Scotch coal; and with the autumn demand for the Baltic now due, no anxiety is felt by coal masters as to the course of the market for September. The following were the prices quoted f.o.b. Glasgow on Thursday: Ell, best brands, 13s.; splint, 12s. 9d. to 15s.; navigation, 15s. to 16s. 9d.; steam, 11s. 9d. to 13s.; Hartley, 14s. 6d.; trebles, 13s. 6d.; doubles, 12s. 9d.; singles, 11s. 3d.; pearls, 10s. 3d. to 10s. 6d.; dross, 8s. to 8s. 6d.

Barnet Gas and Water Company.—The report which the Directors will submit at the half-yearly ordinary general meeting of the Barnet District Gas and Water Company next Friday, dealing with the working for the six months ended June 30, states that the balance standing to the credit of the profit and loss account amounts to £33,187, out of which the Directors recommend the declaration of a dividend, less income-tax, for the six months, at the rate of 8½ per cent. per annum on the "A" and "C" stocks, 7½ per cent. per annum on the "B" stock, and £5 19s. per cent. per annum on the "D" capital gas and water stocks.

Well Water Supply in the City of London.—In his report for the past year, the Medical Officer of Health for the City of London says that three separate buildings have been added to the already large number deriving their supply of water from wells sunk in the City. Samples of the water from the wells have been submitted to the Public Analyst with satisfactory results. Recourse to the artesian well for a water supply has now been made in 52 buildings; and the Medical Officer is informed that the increasing demand made upon the water-bearing strata has not resulted in any appreciable lowering of the water "rest" level of those already in existence.

Tamworth Gas Company.—Dr. A. M. Sculthorpe (Vice-Chairman) presided last Saturday afternoon at the annual meeting of the shareholders of the Tamworth Gaslight and Coke Company. The Directors submitted a report and statement of accounts, showing a profit for the year of £1850. A dividend for the half year ending Dec. 31 of 10 per cent. on the old shares and 7 per cent. on the new shares was declared in February; and the Directors now recommended the payment of similar dividends for the six months ended June 30. The extensions to outlying parishes had, it was said, so far been most satisfactory, having resulted in a fair consumption of gas. The report and accounts were adopted.

Strood Water Supply.—Dr. John C. Thresh, the Medical Officer of Health for Essex, who was engaged by the Rochester Corporation to report upon the Strood water supply as it now exists with filtration plant in working order, has informed the Council that the well with its present surroundings is liable to pollution both with sewage and with tidal water, and that the pollution from the latter source will almost certainly increase. Inasmuch as Strood has no second line of defence, Dr. Thresh recommends the Council to take steps to provide a supply of water from a well farther away from the influence of tidal water and from any centre of population. The Corporation have decided to ask the Brompton Water Company, the Higham and Hundred of Hoo Water Company, and the Mid-Kent Water Company, whether they would be willing to supply approximately 350,000 gallons of water per day, connecting their mains with the Strood system at the nearest point. The Council are also proposing to obtain the opinion of Mr. William Whitaker, F.R.S., as to a suitable position for the sinking of a new well. A curious mishap occurred last Sunday week at the water-works; the water having become impregnated with bitumen with which a filter-bed had been coated, and had not thoroughly dried. The occupants of the houses in miles of streets had their mid-day meals spoiled, and later were unable to drink either tea or water.

Knutsford Light and Water Company.

The accounts for the six months ended the 30th of June which were presented at the half-yearly meeting of this Company last Tuesday showed a sum of £1327 available for distribution on the gas, and £1153 on the water account. Dividends were paid at the rates of 10½ and 7½ per cent. per annum out of the former amount, and of 7⅛ and 5 per cent. per annum out of the latter. The working, under the supervision of Mr. Frank H. Robinson, Assoc.M.Inst.C.E., the Manager, resulted in the production of 19,639,600 cubic feet, or 11,235 cubic feet per ton of coal carbonized. The total make was an increase of 12¾ per cent. on the figures for the first half of 1912. The cost into the holder was 13·77d. per 1000 cubic feet. The quantity of tar made per ton of coal was 14·41 gallons; of ammoniacal liquor (5° Twaddel), 26·01 gallons; and of coke for sale, 9·88 cwt. There are 536 ordinary and 326 prepayment consumers; and on the 30th of June there were 203 cookers and 18 gas-fires on hire, and 152 free grillers in use. The water pumped into the town was 40,634,000 gallons, or 37½ gallons daily per head of the population. The total pumping costs, exclusive of interest and distribution charges, came to 1·1d. per 1000 gallons.

Coke-Oven Gas in the Rhondda.

In the article headed "A Ten-Feet Gas Flare in Glamorgan" which appeared in the last number of the "JOURNAL" (p. 513), it was mentioned that an offer had been made by the Cambrian Combine to supply the surplus gas from their coke-ovens to the Rhondda District Council at 7½d. per 1000 cubic feet. Mr. Albert R. Cawley has written to the "Western Mail" to point out that the offer is for gas delivered to the Council at the works of the Combine; and therefore the corresponding figure to the 7½d. is the cost of gas at the Council's works as stored in the holder, less receipts for residuals. Distribution costs will be the same in both cases. He goes on to show that, before a comparison can be made of the two prices, information on the following points is necessary: (1) Calorific power of the gas in British thermal units per cubic foot. (2) Illuminating power in sperm candles, and the number of the test-burner (whether No. 1 or No. 2) employed. (3) Chemical analysis of the gas. He also thinks information should be given as to whether the heating and illuminating power of the gas are permanent, and whether the gas will bear transmission to the extreme ends of the district without depreciation; also as to what guarantee there is in connection with the latter.

New Water and Lighting Area at Portrush.—The Local Government Board for Ireland have granted an application of the Antrim County Council altering the boundaries of the counties of Antrim and Londonderry so as to include in the former and in the urban district of Portrush Glenmanus and the important residential area of Craig-dhu-Varren for the purpose of providing proper lighting, water supply, and sewerage schemes.

Blazing Gas-Main in the City.—Just before midnight last Wednesday, the London Fire Brigade were called to Fenchurch Street to extinguish a volume of burning gas. The accounts of the occurrence which appeared in the papers were greatly exaggerated; but the following are the facts: Some workmen employed by the Asphalte Paving Company drove a wedge into a 4-inch main, and the liberated gas became ignited, probably by the fire employed in the paving operations. The electricity supply cables were also damaged. As promptly as possible the main was plugged, and the gas cut off.

Electric Wire Dangers.—An attendant in the Clonmel Lunatic Asylum has been obliged to resign his position on admitting that he had tapped an electric wire in the institution, and brought another wire from it between a roof and ceiling to fix up an electric lamp. Dr. Harvey, the Resident Medical Superintendent, said the result might have been the destruction of the Asylum by fire; and he instanced a like danger in his own house, when a servant, driving a nail in a wall, accidentally interfered with the electric wires, so that the whole force of 250 volts had been turned on to the door bell and the wires fused. Mr. Murphy, the Electrical Engineer, said the danger existing in the Asylum had only been discovered accidentally.

Enfield Gas Company.—At the meeting of this Company on the 4th prox., the Directors will report that the profits for the six months ended the 30th of June, after allocating £450 to the credit of the special purposes fund and £150 to the reserve fund, and paying interest charges, were £5169; and they recommend the declaration of the following dividends, subject to income-tax, for the half year: At the rate of 5 per cent. per annum on the consolidated preference stock, of 5⅛ per cent. per annum on the consolidated ordinary stock, and of a further dividend at the rate of 1½ per cent. per annum on the latter stock. This will absorb £5144, and leave £25 to add to the undivided profit to be carried forward; making that fund £11,596 in all. The Bill promoted last session by the Tottenham and Edmonton Gas Company received the Royal Assent on the 15th inst. Under its provisions, the respective undertakings of that Company and of the Enfield Company will be amalgamated from the 1st of January next.

Taunton Gas Company.—The annual general meeting of this Company was held last Tuesday—the Chairman, Mr. W. H. Fisher, presiding. The Directors reported that the quantity of gas sent out during the twelve months had been 112,649,600 cubic feet. The amount available for distribution was £7690, out of which they recommended dividends at the rates of 5 per cent. on the preference stock, 9 per cent. on the consolidated "A" stock, and 7⅛ per cent. on the yellow shares and on £15,900 of new ordinary stock. These dividends would absorb £4410. The Chairman, in moving the adoption of the report, congratulated the shareholders on the fact that, though they had reduced the price of gas during the twelve months to the extent of 4d. per 1000 cubic feet, they were able to maintain the same dividends, in spite of the difficulties they had to contend with in the shape of the increased cost of coal and materials generally. He also referred to the labour unrest. The motion having been carried, votes of thanks to the Chairman and Directors, as well as to the Secretary and Manager (Mr. A. J. Edwards) and staff, were passed.

Mellor Water Supply.—The serious and long-standing problem of the water supply for the growing district of Mellor, where many Manchester business men reside, is likely to be solved without cost to the ratepayers. At a meeting of the Hayfield and Mellor District Council on Monday last week, it was reported that the Stockport Corporation were willing to supply Mellor with Kinder water on terms similar to those charged to Hayfield, in the event of 50 per cent. of the consumers taking the water. The terms were approved, subject to the ratepayers' sanction.

Harrogate Water-Works.—It has been decided by the Harrogate Corporation to apply to the Local Government Board for sanction to the borrowing of £7300 in respect of the Harrogate Water-Works at Round Hill. The works are practically completed, and the money is to meet the cost of work already carried out. It is expected that this will be the final loan, and that it will now be possible to arrive at the total cost of the Masham scheme. The sum of £433,949 has been granted for works, and the new application, if sanctioned, will bring up the expenditure to £441,249; but this must be added to the sum of £88,665 for interest in connection with the suspension of the repayment of the first large loan for the period of ten years. This raises the total expenditure to £529,914.

Rossendale Union Gas Company.—In the report of the Directors of this Company for the half year ended the 30th of June last, the Directors state that the sales of gas show an increase of 4½ per cent. over those for the corresponding period of 1912. The price of gas has been reduced by 1d. per 1000 cubic feet, to 2s. 9d., from the commencement of the current quarter. The profit for the half year is £6003. Statutory dividends are being paid as follows: Original, new ordinary, and preferred ordinary shares, 10 per cent.; 1876 Act shares, 7½ per cent.; Amendment Act and New Amendment Act shares, 5 per cent. The total capital account is £179,625; the share capital paid up, £136,079; the amount paid in anticipation of calls, £24,192; the loan capital borrowed, £1250; and the reserve fund, £11,339. The sale of gas realized £17,657; and gas manufacture cost £8616.

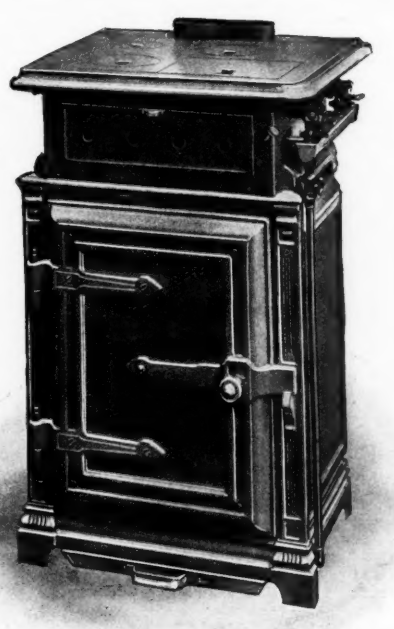
Newark Gas Company.—The report of the Directors of this Company for the year ended the 30th of June shows that a profit of £3691 was made. Holders of "A" shares receive a dividend of 11⅜ per cent.; of "B" shares, 5 per cent.; and of new ordinary shares, 8⅜ per cent. The Directors state that the year was satisfactory on the whole, though the price of coal advanced further. Contracts have been placed for part of next year's requirements; but the Directors do not anticipate any better terms being obtained. Notwithstanding this, the price of gas was reduced in March from 2s. 6d. to 2s. 5d. per 1000 cubic feet. There have been increases in the number of consumers by both ordinary and prepayment meters. The Directors are converting a bench of retorts into regenerative settings, and the work is almost completed. The contract was placed with Messrs. Robert Dempster and Sons, Limited.

Belfast Gas Loans and Profits.—The Belfast City Accountant (Mr. R. G. Geade), in his "Abstract of Municipal Accounts" for the year ended in March last, states that the loans connected with the gas undertaking amount to £417,075, and that of the gas profits for the year a total of £21,385 went to the relief of rates—this total being made up of a grant of £10,000 to the Finance Committee of the Corporation for that direct purpose, and one of £11,385 for interest and redemption fund on the outlay on the new City Hall.

Coal Dust Explosion at the Rochester Gas-Works.—An explosion of coal dust occurred in a newly-erected retort-house at the Rochester Gas-Works on Friday, the 15th inst. The stoking machinery is driven by electricity, and the explosion was due to the fusion of a wire connected with it. It caused a fire which resulted in considerable damage; and one of the workmen was badly burnt. By the aid of apparatus lately installed on the works, the fire was kept in check until the arrival of the fire brigade, when it was soon extinguished. The newly appointed Engineer, Mr. C. V. Bennett, was not on the works at the time, as he will not take up his duties until the 1st prox.

Elsecar, Wentworth, and Hoyland Gas Company.—According to the report presented at the recent annual general meeting of this Company, the quantity of gas manufactured during the year ended the 30th of June was 40,676,400 cubic feet—an increase of 1,013,200 cubic feet. The coal used during the year was 4025 tons 13 cwt., or 306 tons 9 cwt. more; the yield being a decrease of 535 cubic feet per ton. The sales of gas show an increase of 271,300 cubic feet through ordinary meters, and 1,360,000 cubic feet through prepayment meters, and an increase of 200,700 cubic feet for the public lamps. Owing to subsidence of the ground, the Directors have found it necessary to rebuild the two benches of retorts in the new section of the retort-house. The amount of profit was £1141, which, with the balance of £1515 from last year, after payment of interest on loans, left a net profit of £2656, out of which a dividend of 10 per cent. per annum, less income-tax, was paid.

Extensions at the Clonmel Gas-Works.—The Clonmel Corporation Gas Committee have decided to apply for authority to borrow £3000, to carry out extensions and improvements at the gas-works. The scheme includes a new retort-house to contain four ovens of seven retorts each on the regenerative system, with a stage-floor and sloping road to them; also a coal-store sufficiently spacious to enable the Committee to obtain supplies in colliers of good size. The coals now come to the works in barges, and are wheeled direct into the store, which has to be kept at a good height owing to the liability of the river to flood. A lift is to be provided to convey the coal bogies to the stage-floor. The present retort-house will be used partly as a coal-store; but some of the retort-settings will be retained, to be heated as at present with the surplus tar, until such time as the local authorities in that part of Ireland find out the advantages of the use of tar for road surfacing. Mr. Henry O'Connor, of Edinburgh, is the Consulting Engineer to the Gas Committee; and he has prepared the scheme now to be carried out.



"MAIN" COOKER HYGIENE.

Fumes from Cooker Hotplate Burners usually escape into the room. In small dwellings this is disagreeable and repels otherwise likely consumers.

To overcome this objection we have brought out a cooker with closed-in top and flue attachment to the hotplate as well as to the oven.

The hygienic superiority of gas cannot be gainsaid if you use "Main" Cookers.

Send for a sample for inspection.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 8, Exchange Place, Donegall Street, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

St. Petersburg Gas-Works Extension.—The new Committee of the St. Petersburg Municipality charged with reorganizing the gas supply have decided that it is requisite to construct new gas-works in a quarter of the town easily accessible by road, and to extend considerably the present distributing system and put down fresh mains. In order to give effect to their decision, it is estimated that the city will have to expend 15,000,000 roubles, or £1,593,750.

Water Supply in the Doncaster Rural District.—At a meeting of the Doncaster Rural District Council last Tuesday, a recommendation of the Sanitary Committee was passed, expressing the Council's willingness to approve and support the application of the Leeds Corporation for an Act of Parliament empowering them to bring water into the rural district and distribute it, subject to satisfactory clauses being inserted for the protection of the Council. A small Committee was appointed to arrange terms with the Corporation.

Floriculture in the Atmosphere of London.—In the course of an interview with a representative of the "Daily News," Mr. E. Owen Greening, F.R.H.S., of the Agricultural and Horticultural Association, Limited, whose "One and All" seeds and publications are well known, stated that the knowledge of the art of gardening is greatly on the increase in London. He said: "In districts within a few miles of the City, flowers are now grown that were quite unknown there a few years ago. The reason is that there is a distinct improvement in the atmosphere, owing to the growing use of gas-fires in place of coal-fires. In a neighbourhood like East Greenwich, three-quarters of the houses now use gas-stoves, and in consequence there is far less smoke coming from their chimneys. Those, like myself, who can look back over sixty years or so, can remember when the London fogs were so black with smoke that we had to be guided by link-boys. There is nothing of that in London now, and one result of this improvement can be seen in the back gardens."

Proposed Nationalization of Mines.—At the conference of the Scottish Miners' Federation in Edinburgh, last Wednesday, the President (Mr. R. Smillie) referred to the proposed nationalization of mines. He said they wanted to prove to the general public that nationalization would not injure them by means of increased taxation. They proposed to pay a fair valuation to the present mine owners. If this could be secured, they believed that the mines could be taken over and the present owners paid a fair price, and that the Government could issue stock which would be held by the owners as a guarantee of having the value of their mines paid them. They believed that the conditions of the miners could be improved, that a large number—probably from 40 to 50 per cent.—of the accidents which now took place would be prevented, and that in thirty years the owners could be paid back the value of their mines without a single penny of taxation being put upon the people. He thought, however, they must in the first place nationalize the Legislature, because he recognized that with, a House of Commons as at present constituted, the probability was that the nationalization of the mines would be a curse rather than a blessing.

Cheaper Gas for Chatteris.—The Directors of the Chatteris Gas Company, Limited, have decided to reduce the price of gas 5d. per 1000 cubic feet, the reduction to take effect from the 1st of July last. This is the fourth reduction, making 1s. 8d. in all, during the time the present Manager (Mr. J. A. Baynham) has held his position.

Wrexham and East Denbighshire Water Company.—The 53rd annual general meeting of this Company was held on the 6th inst., when the Directors reported a sum of £7779 available for distribution, and recommended the payment of dividends for the past half year at the rate of 7 per cent. per annum upon the consolidated stock, and of £4 18s. per cent. per annum upon the ordinary stock, less income-tax. Regret was expressed at the loss sustained by the Company by the death of Mr. J. Allington Hughes, who had been Chairman for nine and a Director for twenty-five years. The dividends recommended were declared; and votes of thanks were accorded to the Engineer and Secretary (Mr. F. Storr) and the Accountant (Mr. R. Roberts).

Frimley and Farnborough Water Company.—At the ordinary general meeting of this Company on the 9th inst., the Directors reported that the balance on the revenue account for the half year ended June 30 was £5288. After paying the interest due upon the debentures, &c., and adding the balance brought forward, there was produced a sum of £12,925. The Directors recommended the declaration of a dividend for the half year at the rate of 7 per cent. per annum, carrying forward £8361. During the past six months, 146 additional house, and 21 meter, connections had been made; and the trunk and service mains had been extended about a mile. The additional high-level service reservoir at Heathy Park was completed and brought into use. The report was adopted, and the dividend declared.

Withernsea Water Supply.—For the past ten years, the people of Withernsea who have been most interested in its future have been agitating for an adequate supply of water. It appears that the Hull Corporation have now offered to furnish one on a scale commencing with a minimum of 55,000 gallons per day, at 1s. 3d. per 1000 gallons, delivered on the boundary of the town; the scale to be gradually reduced to 10½d. per 1000 gallons when the consumption reached 300,000 gallons and upwards. This offer has not been entertained by the Withernsea Urban District Council, who have under consideration two schemes submitted by a Newcastle firm of engineers. Under one it is proposed to purchase as a gathering-ground 450 acres of land about two miles from the town, on which a reservoir and filters would be erected. The estimated cost of this scheme is £40,000; and the promoters claim that it would ultimately be very much cheaper than the offer made by Hull. As an alternative, the firm suggest a second scheme, under which Withernsea should itself establish water-works in the Hull area of supply, lay a main to Withernsea, and so get water from the Wold country of the same quality as is now obtained by Hull. The estimated cost of this project is £27,000. Both schemes, it is stated, are at variance with the opinions of the experts who were sent down by the Local Government Board.

East Cowes Water Supply.—At the meeting of the East Cowes District Council last Tuesday, a letter was read from the Local Government Board stating that the Board could not understand upon what ground the Council had reported that they had an ample supply of water, after the report of insufficiency received from Mr. Percy Griffith in 1911. In the course of a discussion, the Surveyor said the Council were now pumping for 20 hours a day, and they had a new reservoir capable of storing a million gallons of water. A reply was directed to be sent, to the effect that the water supply was now in a much better condition than formerly.

Hawarden Water Company.—The report submitted by the Directors to the half-yearly meeting of this Company recently held at Chester set forth that there was a balance of £1427 available for distribution, after providing for debenture interest and transferring £200 to the reserve account. This admitted of the payment of a dividend of 4 per cent. per annum, carrying forward £274. Mr. W. Haswell, the Chairman, moved the adoption of the report, and explained that the total issue of share capital was £57,680, out of the £60,000 authorized. The balance on the revenue account was £1426, and would be nearly sufficient to pay a dividend of 5 per cent. for the half year; but the Directors thought it would be better to give 4 per cent., and bring the reserve account up to £4000. The motion was adopted, and the dividend as recommended declared.

East Worcestershire Water Company.—The report of the Directors of this Company for the six months ended June 30 shows that an average of 1,156,000 gallons of water were pumped daily. The second set of the new pumps has been fixed at Burcot, and the cost, less scrap sold, has been added to capital expenditure; making the total for replacement of machinery, &c., £5441. The pumps have been thoroughly tested, and are reported to be satisfactory. The half-yearly accounts show a further reduction in the pumping charges; but the full benefit of the new pumps does not yet appear. The net profit is £2614, which, with £1349 brought forward, makes a disposable balance of £3963. This it is proposed to appropriate as follows: To pay a dividend for the half year at the rate of 5 per cent. per annum, free of income-tax; to provide £450 for depreciation on machinery and mains; and to carry forward the balance of £1682.

On the afternoon of the 16th inst., the members of the Belfast Association of Engineers, accompanied by lady friends, had the privilege of inspecting the gas-works under the guidance of the engineer and Manager (Mr. J. D. Smith), assisted by Mr. Owens and the staff. The party were first shown the installation of vertical retorts, with the accessory handling plant, and then visited the other departments of the works. They were highly impressed with the efficiency of the plant; and, before leaving, a hearty vote of thanks was accorded to the Gas Committee, Mr. Smith, and Mr. Owens for the courtesy they had shown.

According to the "Coal Trade Journal," recently completed reports show that the Gas Companies in New York consumed 1,431,135 net tons of coal during the year 1912.

The Bingley Urban District Council have purchased for £2500 the iron foundry of Mr. Benjamin Moore, on the bank of the River Aire. The premises will eventually be used in connection with extensions of the adjoining gas-works.

The Mitchelite Company, Limited, has been registered with a capital of £25,000, in 5s. shares (50,000 six per cent. cumulative participating preference), to acquire inventions relating to the production, storage, and use of gas, petrol, and electricity.

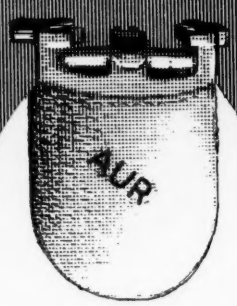
The Chiswick Empire Theatre was practically destroyed by fire in the early hours of Wednesday last. The cause of the outbreak has been attributed to a lighted match carelessly thrown down, or to the fusing of an electric light wire on the stage. The loss is estimated at £16,000.

In connection with the large extensions which are being carried out at the Widnes Gas-Works, referred to elsewhere. Messrs. Thomas Piggott and Co., Limited, of Birmingham, have received an order for a set of ten annular condensers, capable of passing 2 million cubic feet of gas per day, to the design and specification prepared by the Corporation Gas Engineer, Mr. Isaac Carr, M.Inst.C.E.

In the action of *Reckitt v. Foreign and Colonial Lighting, Limited*, which came before Mr. Justice Astbury last Wednesday, the plaintiff asked for the appointment of a Receiver. Counsel stated that plaintiff was the holder of certain deeds of charge in respect of advances made from time to time to the Company. Counsel for defendants thought the application a reasonable one; and he consented to the appointment. His Lordship accordingly made the necessary order.

We have received the latest issue of the catalogue of the Provincial Incandescent Fittings Company, Limited (best remembered as "Pifco"). When it is mentioned that it contains 116 large pages (12 in. by 9½ in.), it is scarcely necessary to say that those who consult it will find a great variety of attractive features. These include a large assortment of mantles and the American inverted and self-intensifying indoor and outdoor lamps. It is accompanied by a supplementary catalogue, giving particulars of the "Percy" lamp, globes, shades, and fittings.

The circumstances attending the death of Elizabeth Lowry, who resided at 14, Wellington Road, Edgbaston, and who was found dead in her bedroom on Sunday, the 17th inst., were investigated by the Birmingham Coroner last Wednesday. Evidence given by the maid was to the effect that the hearing and sense of smell of the deceased were defective. She was in the habit of hanging things on the gas-brackets, and the fittings were not in good order. Other evidence was that two taps were found turned on—one in Miss Lowry's room and the other in that of the maid, and both were very slack. The supposition was that the gas had been accidentally turned on; and a verdict of "Accidental death" was returned.



Welsbach

GAS MANTLES

British Made.

INVERTED AND UPRIGHT

(C, CX, & PLAISSETTY.)

SAMPLES FREE.

THE WELSBACH LIGHT CO.,

LIMITED,

WELSBACH HOUSE, KING'S CROSS, LONDON, W.C.

Irish Depot: 197, Great Brunswick Street, Dublin.

WELSBACH MANTLES —the original and still the best—exceptionally strong and brilliant. They can be used successfully with any type of burner.

Welsbach Premier Mantles made of Woven Ramie Fabric are specially suitable for Street Lighting and Maintenance.

GAS COMPANIES' STOCK AND SHARE LIST.

Business on the Stock Exchange last week—an abbreviated week of five working days only—was of the quietest, probably reaching something near holiday low-water mark. If it had not been for some degree of alarm being caused about midway through it, by the threatening aspect of Balkan and Mexican affairs, the course of business would have been very tame and uneventful. However, the depressing tendency was relieved before the close. The opening day was inactive, with the not unusual consequence that the tone was dull simply from sheer inanition, and not because of any disquieting factor. Government issues were inert, and Consols a shade easier. Rails were rather apprehensive of possible labour agitation. Americans hung at first and then revived somewhat; and Foreign were fair. On Tuesday, the repose of the markets was rudely disturbed by apprehension regarding the Near East and the Far West, coupled with further unrest in labour circles. Markets in general gave way. Consols were lower, railway prices fell all round, and the rest were weaker. On Wednesday, things were as quiet as ever, if not more so. The opening tendency was timid; Foreign affairs being regarded uneasily. Prices accordingly were prudently adjusted. Later on, calmer views prevailed, and some recovery supervened. Consols rose from 73⅝ to 73⅞, Rails took heart from good traffic returns, and Americans strengthened. Business was still at a very low ebb on Thursday; and things moved anyhow when they moved at all. But some buying of Consols put the price up another ⅛. As for other leading markets, however, they showed no improvement. The Stock Exchange week died quietly on Friday—Saturday being a closed day; and few regretted it. Business dwindled away to nothingness; and no particular feature was apparent but a little weakness in Americans. Consols closed at 73¾ to 74—a rise of ⅛ in the week. In the Money Market, there was a moderate demand, which fell off before the close. Business in the Gas Market was quite on a holiday scale; but the tendency was very firm, and several advances in quotation were scored. In Gaslight and Coke issues, the ordinary was moderately dealt in at very steady figures; all transactions being within the limits of 101⅝ to 102½. In the secured issues, the maximum was done at 76½ and 76¾, and the preference at 95. South Metropolitan was quiet and unchanged, marking from 108¾ to 109½; and the debenture realized 73½ and 73¾. In Commercials, there were dealings in the 4 per cent. at 107¼ and 108, in the 3½ per cent. at 104½, and in the debenture at 72 and 72½—all three issues advancing 2 each. Among the Suburban and Provincial group, the only dealings were in Bournemouth "B" at 15⅝, and in Liverpool "B" at 145½ on the local Exchange. In the Continental companies, Imperial changed hands at 162 to 164½, Union at 81½, and European at 17⅞ to 18⅛—a rise of ¼. Among the undertakings of the remoter world, Melbourne realized 99, Primitiva 6⅛ to 6⅜, and ditto preference 5 to 5⅛.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	April 11	5	Alliance & Dublin Ord.	63–68	..	7 7 1
874,000	,,	July 11	4	Do. 4 p.c. Deb.	80–83	..	4 16 5
280,000	5	April 11	7½	Bombay, Ltd.	6¼–6⅝	..	5 11 1
50,000	10	Feb. 27	15	Bourne- mouth Gas and Water Co.	10 p.c. B 7 p.c. Pref. 6 p.c.	..	4 8 11
347,500	10	,,	7		15¼–15⅝	..	4 8 11
75,000	10	,,	6		13⅞–14¼	..	4 4 3
880,000	Stk.	Aug. 14	14	Brentford Consolidated	259–264*	+1	5 6 1
830,000	,,	,,	11	Do. New	196–201*	+1	5 9 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	111–113*	..	4 8 6
206,250	,,	June 13	4	Do. 4 p.c. Deb.	94–96	+2	4 3 4
217,380	Stk.	Feb. 27	11	Brighton & Hove Orig.	206–211	..	5 4 3
244,200	,,	,,	8	Do. A Ord. Stk.	151–154	..	5 3 11
530,000	20	Mar. 28	12½	British	45–46	..	5 8 8
120,000	Stk.	June 27	4	Do. 4 p.c. Deb. Stk.	87–89	..	4 9 11
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	83½–91½	..	4 7 5
100,000	10	—	—	Cape Town & Dis., Ltd.	2–3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4–5	..	—
100,000	Stk.	June 27	4½	Do. 4½ p.c. Deb. Stk.	75–80	..	5 12 6
157,150	Stk.	Aug. 14	5	Chester 5 p.c. Ord.	107–109*	..	4 11 9
1,513,280	Stk.	Feb. 27	5/9/4	Commercial 4 p.c. Stk.	107–109	+2	5 0 3
560,000	,,	,,	5½	Do. 3½ p.c. do.	104–106	+2	5 0 7
475,000	,,	June 13	3	Do. 3 p.c. Deb. Stk.	71–73	+2	4 2 2
800,000	Stk.	,,	4	Continental Union, Ltd.	80–83	..	4 16 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	124–126	..	5 11 1
492,270	Stk.	—	5	Derby Con. Stk.	123–124	..	—
55,000	,,	—	4	Do. Deb. Stk.	102–104	..	—
1,002,180	10	July 30	10	European, Ltd.	17½–18½	+¼	5 8 1
16,386,660	Stk.	Aug. 14	4/17/4	Gas-light & Coke	4 p.c. Ord.	101–103*	..	4 14 6
2,600,000	,,	,,	3½		3½ p.c. max.	74–77*	..	4 10 11
4,062,235	,,	,,	4	and Coke	4 p.c. Con. Pref.	93–96*	..	4 3 4
4,674,850	,,	June 13	3		3 p.c. Con. Deb.	73–75*	..	4 0 0
258,740	Stk.	Mar. 13	5	Hastings & St. L. 3½ p.c.		89–91	..	5 9 11
82,500	,,	,,	6½	Do. do. 5 p.c.		—	..	—
70,000	10	April 25	11	Hongkong & China, Ltd.		17½–17⅝	+½	6 3 11
131,000	Stk.	Mar. 13	7⅞	Ilford A and C		152–155	..	4 18 4
65,780	,,	,,	6⅛	Do. B		120–122	..	5 0 5
65,500	,,	June 27	4	Do. 4 p.c. Deb.		89–91	+2	4 7 11
4,940,000	Stk.	May 16	9	Imperial Continental		162–167	..	5 7 9
1,285,000	Stk.	Aug. 14	3½	Do. 3½ p.c. Deb. Red.		83–85*	..	4 2 4
200,242	Stk.	Mar. 13	£½†	Lea Bridge Ord. 5 p.c.		121–124	..	5 0 10
561,000	Stk.	Feb. 27	10	Liverpool United A		208–210	+1	4 15 3
718,100	,,	,,	7	Do. B		145–147	..	4 15 3
306,083	,,	June 27	4	Do. Deb. Stk.		96–98	..	4 1 8
63,480	Stk.	June 27	3	Maidstone 3 p.c. Deb.		66½–68½	..	4 7 7
75,000	5	June 13	6	Malta & Mediterranean		4⅜–4⅞	..	6 3 1
250,000	100	April 1	4½	Melbourne Met. of 4½ p.c. Deb.		98–100	..	4 10 0
541,920	20	May 30	4	Monte Video, Ltd.		12⅝–13	..	6 3 1
1,775,892	Stk.	July 20	4½	Newc'tle&G'tesh'd Con.		97–98	+½	4 11 10
529,705	Stk.	June 27	3½	Do. 3½ p.c. Deb.		83½–84½	..	4 2 10
55,940	10	Feb. 27	7/7/0	North Middlesex 7 p.c.		15–14	..	5 4 7
300,000	Stk.	May 16	8	Oriental, Ltd.		124–129	..	6 4 0
60,000	5	Mar. 28	10	Ottoman, Ltd.		6¼–6⅞	..	5 14 3
60,000	50	Aug. 14	13	Portsea, Island B		122–125*	..	5 6 1
100,000	50	,,	12	Do. C		119–122*	..	4 18 4
249,980	5	May 16	8	Primitiva Ord.		6–6⅛	..	6 3 1
499,960	5	June 27	5	,, 5 p.c. Pref.		5–5⅛	..	4 15 3
521,600	100	June 2	4	,, 4 p.c. Deb.		93–95	..	4 4 3
346,198	Stk.	June 27	4	River Plate 4 p.c. Deb.		90–92	..	4 7 0
275,000	5	Apl. 11	12	San Paulo, Ltd.		—	..	—
150,000	10	,,	6	Do. 6 p.c. Pref.		11½–11⅝	..	5 2 2
125,000	50	July 1	5	Do. 5 p.c. Deb.		48–50	..	5 0 0
135,000	Stk.	Mar. 13	10	Sheffield A		225–227	..	4 8 1
209,984	,,	,,	10	Do. B		225–227	..	4 8 1
523,500	,,	,,	10	Do. C		223–225	..	4 8 11
90,000	10	May 30	7½	South African		9⅛–10½	..	7 2 10
6,429,895	Stk.	Aug. 14	5/9/4	South Met., 4 p.c. Ord.		108–110*	..	4 19 4
1,895,445	,,	July 11	3	Do. 3 p.c. Deb.		72–74	..	4 1 1
209,820	Stk.	Aug. 14	8½	South Shields Con. Stk.		157–159*	..	5 6 11
952,795	Stk.	,,	6	S'th Suburb'n Ord. 5 p.c.		114–116*	−1	5 3 5
60,000	,,	,,	5	Do. 5 p.c. Pref.		113–115*	..	4 6 11
117,058	,,	June 27	5	Do. 5 p.c. Deb. Stk.		115–117	..	4 5 6
594,740	Stk.	May 16	5	Southampton Ord.		102–105	..	4 15 3
120,000	Stk.	Aug. 14	7⅛	Tottenham and A 5 p.c. B 3½ p.c.		136–139*	..	5 6 1
543,940	,,	,,	5⅝			113–115*	..	5 2 2
149,470	,,	June 27	4	Edmonton 4 p.c. Deb.		90–92	..	4 7 0
182,380	10	,,	5	Tuscan, Ltd.		5–6	..	8 6 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.		94–96	..	5 4 2
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.		112–113*	..	4 8 6
30,000	Stk.	..	8⅜†	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.		160–165	..	5 1 6
255,636	,,	..	6⅞†	,, B 3½ p.c.		132–137	..	5 0 4
108,075	,,	..	5/17/8†	,, C 3½ p.c.		113–118	..	4 19 6
352,000	,,	..	6⅛†	Wimbledon 5 p.c.		110–115	..	5 6 6
£8,000	,,	..	6⅜†	Epsom 5 p.c.		117–122	..	5 8 7
88,416	,,	June 27	3	3 p.c. Deb. Stk.		68–70	..	4 5 9

Prices marked * are "Ex-Div." † Next Dividend will be at this rate.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

ENGINEER AND DRAUGHTSMAN. No. 5781.
JUNIOR CHEMIST. No. 5779.
SHOW-ROOM ATTENDANT. No. 5780.
ASSISTANT RENTAL AND GENERAL CLERK. No. 5776.
GAS-FITTERS. Aldershot Gas Company.

Appointments, &c., Wanted.

ENGINEERING POSITION (Home or Abroad). No. 5774.
SULPHATE MAKER. No. 5775.
CONTROLLER OF GAS SALES. No. 5777.

Plant, &c, Wanted.

GAS ENRICHMENT PLANT. No. 5778.

Plant, &c. (Second-Hand), for Sale.

GAS-METERS. Mason, Gateshead-on-Tyne.
PURIFIERS, WASHER, EXHAUSTERS, AND RETORTS. South Suburban Gas Company.

Patent Licences, &c.

PROCESS FOR UTILIZING UNMINED COAL. Marks and Clerk, 57 and 58, Lincoln's Inn Fields, W.C.

TENDERS FOR

Coal.
MALTON GAS COMPANY. Tenders by Sept. 6.

Gas Oil.
ROCHDALE GAS DEPARTMENT. Tenders by Sept. 3.

Gas Plant.
PURIFIERS AND LIQUOR STORE TANKS. Coventry Gas Department. Tenders by Sept. 15.

Tar.
HEREFORD GAS DEPARTMENT. Tenders by Sept. 8.
PENRITH GAS DEPARTMENT. Tenders by Sept. 2.
RADCLIFFE AND PILKINGTON GAS COMPANY. Tenders by Sept. 3.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING FLEET, LONDON." Telephone: 6857 Holborn.